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IMPROVED CAPSTAN FOR SHIPS.

Fig. 1

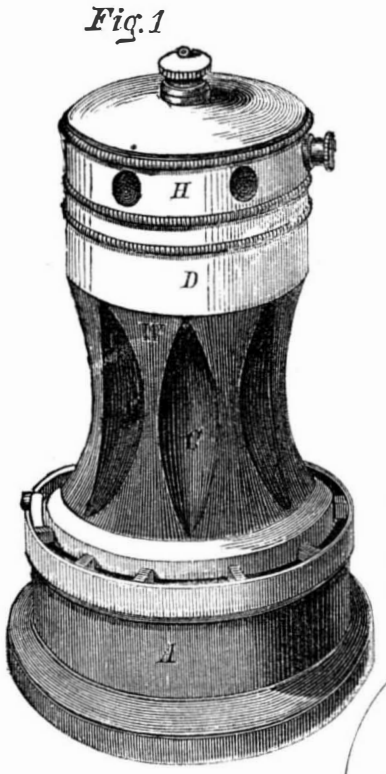


Fig. 2

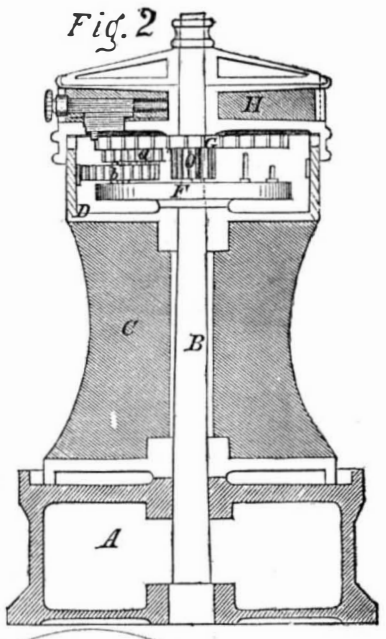
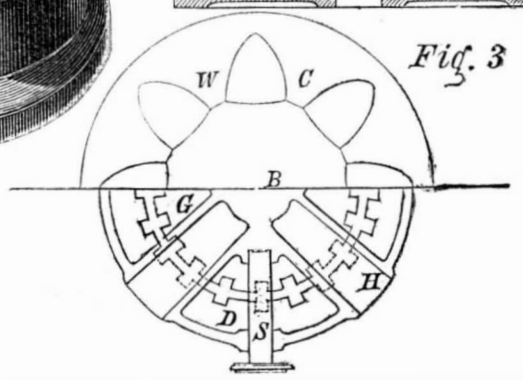


Fig. 3



Improved Capstan for Ships.

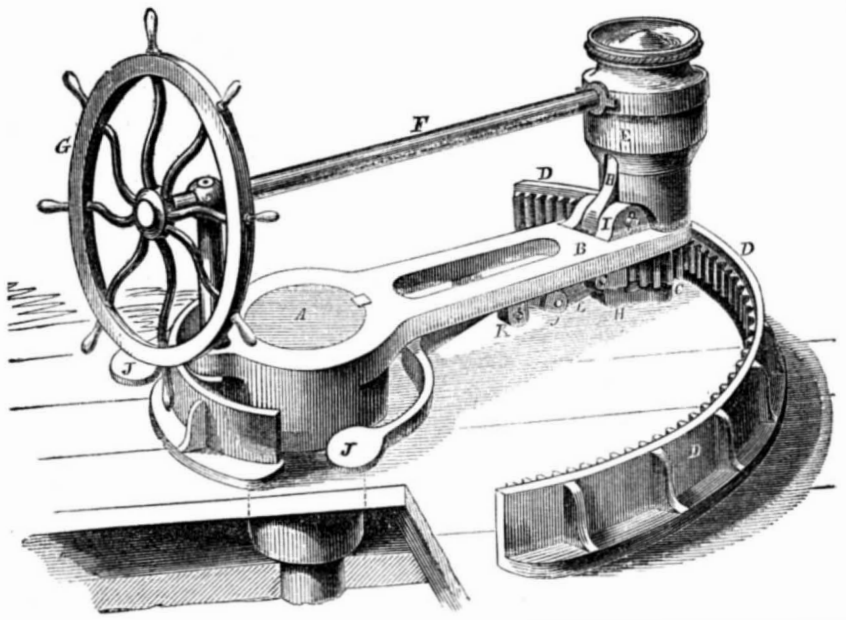
The accompanying figures illustrate an improvement in capstans, for which a patent was issued to J. B. Holmes, on the 3d of March last. A capstan is somewhat similar to a single windlass, placed upon a vertical instead of a horizontal shaft or spindle. It is generally employed as a raising or moving machine, by winding up a drag chain, hawser or cable around its vertical barrel, and paying it off as regularly as it is wound on, to raise or move a heavy body. It is a most convenient and useful machine, and its application on shipboard and for moving heavy bodies is familiar to most persons. The general application of any machine—its common use—renders every improvement on it, however small, of great moment, because it affects a vast number of persons and interests. The barrels of windlasses are made with a series of elevations and depressions, the former called welps, for the purpose of holding the chain as it is wound on. Owing to the manner in which these elevations and depressions have been formed hitherto on the barrels of windlasses, the chain did not slide freely on them towards the middle as fast as it was wound up, and as a consequence one turn was liable to overlie another. The simple improvement in this capstan obviates this, and some other defects in their construction.

Fig. 1 is a perspective view; fig. 2 a vertical section, and fig. 3 a horizontal section taken at the center of the barrel head and capstan head. The bottom plate, A, of the capstan is secured firmly to the deck; B is the stationary shaft on which the barrel, C, moves; D is the cap piece firmly attached to the barrel. The upper ring of the capstan has notches for the reception of a sliding clutch, S. A plate, F, is keyed fast to shaft B to sustain the spindles or centers of the gear wheels and pinions in the cap, consisting of multiplying gearing, *b*, *a*, O, for the fast or slow motion of the capstan. The head, H, of the capstan turns freely on the shaft B. The handspikes are inserted into the holes or openings in it. and when these are turned round, the barrel C is revolved. The sliding clutch, S, is fitted into head H. When this clutch is so moved that a projection on it takes into one of the recesses of the cap-piece D, the head, H, and the cap-piece, D, then clutch together, and the barrel, C, is rotated by direct action. By moving the clutch, S, a little further inward, the projection on the clutch takes into a recess in plate G, as shown in fig. 3; the head, H, when moved round thus communicates motion through pinion O—fast on this plate—to the wheels, thus setting in motion the multiplied gearing, as required.

The barrel, C, is formed with welps, or ridges, W. These are made narrowest at the middle, leaving spaces of greatest width there between them; the welps are also made the whole length of the barrel. By thus constructing them, the chain slides freely and easily towards the middle of the barrel as fast as it is wound upon it. The welps are also made high to catch the uneven parts of the chain, which enables it to be held by one or two turns around the barrel, thus allowing a very short barrel to be used. It also dispenses with the use of feeding strips to keep the chain on the small part of the barrel, and it prevents the chain from riding, (one part overlieing another,) as it is wound at the upper portion of the barrel and run off below.

For more information, see note at the end of the description of the succeeding machine, which is an improvement by the same inventor.

HOLMES' SHIP STEERING APPARATUS.



The ends to be accomplished by the great varieties of steering devices used on shipboard are quite peculiar. It is necessary in "tacking" or "going about," to change the position of the helm quite rapidly from an intermediate position to one extremity of its motion, and in some cases it is desirable to shift the helm with great alacrity from one extreme of its position to the other. While these necessities preclude the obtaining of any extremely great multiplication of "purchase" by the introduction of worm wheels or the like, a great force is demanded to turn the rudder of a large ship and especially to steady and retain the same when its broad surface is acted on by a heavy sea.

Mr. John B. Holmes, of this city, is the inventor of the improvement illustrated by the accompanying perspective view, which is secured by letters patent dated March 3d, of the present year. It combines a suitable means of moving or changing the position of the helm or tiller with a kind of brake for bringing to bear a considerable amount of friction to aid in holding it. The wheel which gives motion to the helm is turned in the ordinary manner by the hand, while the brake which holds it, or aids in holding it in any position, is worked in a very simple manner by the foot.

A represents the head of the rudder; B the tiller or helm, and G the steering wheel. On the extremity of B is carried an upright shaft, at the bottom of which is a short gear wheel, C, meshing into the curved rack, D, which latter is bolted firmly to the deck. The upright shaft is connected to the shaft, F, of the steering wheel by bevel gears concealed within the housing, E, so that any revolution given by the helmsman to the wheel, G, results in revolving the wheel, C, and consequently in turning the rudder. The number of revolutions of the steering wheel required to produce a certain amount of angular motion in the rudder, or in other words, the "purchase" of the man at the wheel in turning the rudder, depends on the relative proportions of the parts, but is intended always to be such as will allow of a pretty rapid turning of the ship.

The means referred to of braking and thus of holding or checking the motion of the wheel by friction are as follows:—The upright shaft which carries the gear wheel, C, is carried at each extremity, not in the housing, E, but in the lever, H, which latter is free to revolve on the bolt represented, which passes through the lugs, I. This lever, H, is connected by a link, L, to the lever, J, which latter is hinged at K, to the under side of B, and can be worked by the foot in such a manner as to turn H slightly on its center, I. The longer portion of the lever, J, is divided as represented, so that it may be operated from either side of the shaft, F. The gear wheels are ordinarily in but a fair contact each with its corresponding gear, but on applying the foot to J, the lever, H, is moved, and the bevel wheels in E, as also the gearing, C and D, are pressed together with great force, and the increased friction tends to hold the whole firmly, or to allow it to work only with considerable difficulty. Instead of forcing the pinion, C, into closer locking contact with the fixed racks, D, the link, L, may be made by a simple and obvious modification of the parts to press directly against D, but the arrangement represented is preferred because it not only aids the helmsman in retaining the command of the helm and holding the wheel with ease in any desired position, but takes up any lost motion or backlash which is usually an objection to the employment of gearing in such situations, and compels the whole to work smoothly and silently, or to remain without any play whenever the wheel, G, is held firmly, however violent and intermittent may be the action of the waves.

The curved rim, M, fixed to the deck on the side of the rudder head opposite to the curved rack, D, is also an important feature of the invention, as it serves by the aid of the friction roller represented between it and the rudder head, to relieve the latter from all the side strain which would otherwise be thrown on it by the device described. Without this provision the effect of the foot applied to J would result in causing violent friction and wear in the rudder post, at the point where the rudder head emerges from the deck, but with this guard all tendency thereto is entirely removed.

It will be observed that this device gives full liberty to the rudder to rise slightly, as it sometimes inclines to do, in a heavy sea, and is in every respect strong and serviceable.

It is now in successful use on two large ships, the *Caravan* and the *Pomona*.

Further information may be obtained by addressing the agent, Mr. John R. Pratt, 67 South street, or 60 and 62 Attorney street, this city.

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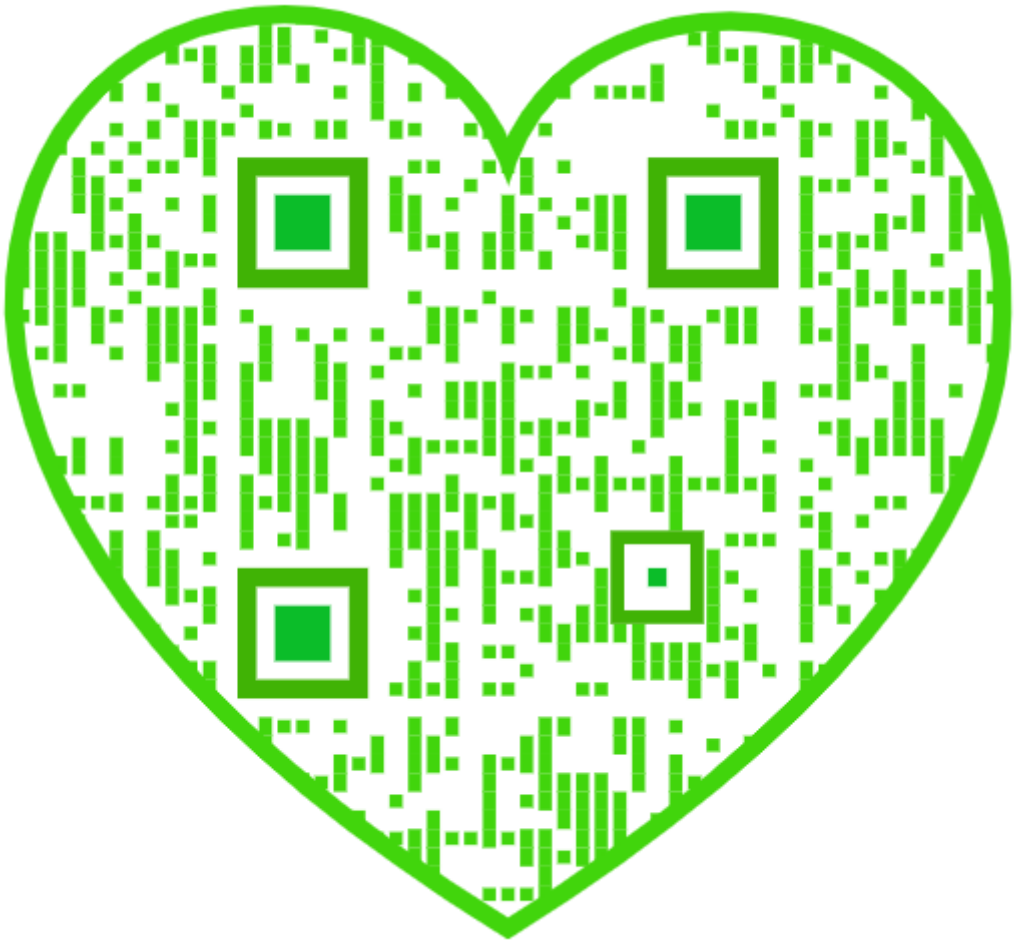

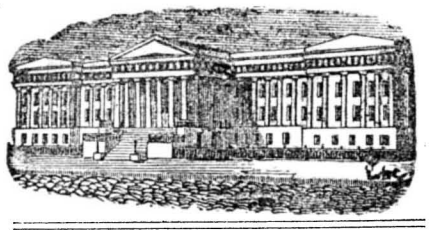

[Reported officially for the Scientific American.]

LIST OF PATENT CLAIMS

Issued from the United States Patent Office

FOR THE WEEK ENDING APRIL 28, 1857.

RAW HIDE WHIPS—Charles Baeder, of Brooklyn, N. Y.: I claim constructing raw hide whips without a core of filler, and giving the wrappers a slight twist, as shown and described.

[Raw hide whips made according to this invention have the strips of which they are made cut angularly, and the butts twisted at an angle of 45 deg. The improvement enables the inventor to manufacture such articles from short hides, hitherto considered unfit for this purpose. This method effects a great saving in the cost of material, while at the same time a superior article of manufacture is produced—very important considerations.]

HARVESTING MACHINES—J. F. Barrett, of North Granville, N. Y.: I claim constructing the combination of the straight forward and back moving knife, N, or its equivalent, with the oscillating or swiveling knives, RR', when constructed and operating substantially as described.

BINDING GRAIN—J. F. Barrett, of North Granville, N. Y.: I claim, in devices for facilitating the binding of grain, twisting or tightening the band after it has been crossed upon the sheaf by the operator, by means of jaws m m, working in balanced shaft, c, in combination with the devices described for simultaneously closing and rotating said jaws, substantially in the manner set forth.

FIREARMS—G. A. Blittkowski, of New York City: I claim, first, the rotating and oscillating breech-piece for receiving the charges so attached to the stock as to be capable of being withdrawn from the end of the barrel, and elevated to receive the charge, and to be returned thereto with a grinding and wedging action, whereby a secure and tight joint is effected, substantially as described.

Second, I claim the safety guard, c, upon the end of the breech-piece, so placed as to prevent the cock from striking the nipple until the said breech-piece is secured in the barrel, as described.

CONSTRUCTING LOCKETS, &c—C. G. Bloomer, of Wickford, R. I.: I claim, first, the making of locket rims out of single pieces of metal instead of two or more, which are everywhere used.

Second, I claim the making of them out of sheet metal instead of wire.

Third, I claim the making of them substantially in the manner described.

SIDEWALK PAVEMENT—J. B. Cornell, of New York City: I claim casting in one piece section of a street gutter, and curbs of suitable shape and proportions, substantially as set forth.

I also claim forming the sidewalk pavement of a series of metallic plates, a a, when said plates are combined with each other, and with the aforesaid metallic street gutter and curb, substantially as set forth.

LOCKS—Leger Diss, of Ilion, N. Y.: I claim the combination of the stop holder. G, self spreading stops, e, and the spring N, with the tumbler moving the stop-holder and needle block, the arrangement and operation being as described.

Second, I claim the needle block, H, as attached to the stop-holder, with its series of needles or pins, operating on the stops as described

Third, I claim the key block, F, constructed as described, and also the needle key, as shown in figures 3 and 4, fitted to its position, and operating as described.

GUILDING AND ORNAMENTING STEEL AND OTHER METALS—A. H. Dufresne, of Paris, France. Patented in France, May 14, 1856: I do not confine myself to the precise working details laid down, as the same may be modified according to the requirements of each operation, without departing from the principle of the invention.

But I claim, first, the application of gold and silver to metals incapable of direct amalgamation by means of the processes described.

Second, The employment of photographic, heliographic and printing processes for the production of the reserves on the metallic surfaces to be operated on by the means described.

Third, The use of chromic acid for the destruction of the nickel, copper, antimony, or other metal employed in these processes as described.

MORTISING STILES FOR BLIND SLATS—E. T. Drake, of Leominster, Mass: I claim the described machine for cutting mortises for window blind slats, constructed in the manner substantially as set forth, and consisting essentially in the carriages E and C, in combination with the cutters, N, and bits n, operating in the manner specified.

PORTS IN STEAM CYLINDERS—Bowen Eaton, of Roanoke, Ind.: I claim the arrangement of the central exhaust and end steam ports as set forth for the admission of steam at each end of the cylinder only, and its eduction from the central port only, the latter being controlled entirely by the piston of the engine cylinder.

FIREARMS—Josiah Ells, of Pittsburg, Pa.: I claim the arrangement of the traverse lever to permit of its playing on the same center as the hammer, without danger of lateral derangement.

Second, The use of the cam in the lock plate, in combination with the shoulder on the traverse lever for the purpose of withdrawing the point of the traverse lever from the radial grooves in the rotating breech in the reaction of the trigger, for the purposes before set forth.

Third, I do not claim the radial grooves in the end of the rotating breech as new in themselves, but I do claim the combination of radial beveled grooves in the rear end of the rotating breech with the traverse lever, as applied to trigger cocking firearms for the purpose of rotating and locking the breech preparatory to firing, substantially as described.

SEED DRILLS—Ezra Emmert, of Franklin Grove, Ill.: I do not claim broadly the use of edge wheels in seeding machines, neither do I claim broadly the use of extension tubes,

But I claim the arrangement and combination of the wheels, E, with the extension pieces, d, in the manner and for the purposes substantially as described.

[A series of wheels, similar to circular edge cutters, are arranged on the axle of the machine in front of the drill teeth, and connected with curved extension tubes. The wheels cut up all obstructions, and ordinary propelling wheels are not required; they also prevent the teeth of the drill from being clogged, which often occurs by coming in contact with sods and stones, and they render the operation of planting, either in drills or check rows, more perfect.]

ACTION FOR GRAND PIANOS—D. F. Haasz, of Philadelphia, Pa.: I do not claim that portion of the described parts which bears directly on the immediate action of the check, J, on the hammer, as that portion is similar to the French action, known as Erard's.

But I claim, first, attaching the supporter, L, to the key and the lever, M, and spring S to the supporter, in the manner and for the purpose set forth.

Second, The arrester, P, with the lever, Q, as connected to the key in combination with the adjustable wire, R, as attached to the key frame, the whole being arranged and constructed substantially as set forth and for the purpose specified.

CHRONOMETRIC LOCKS—Amos Holbrook, of Milford, Mass., and H. D. Fish, of Hardwick, Mass.: We do not claim the employment of two or more clocks to operate chronometric locks.

But we claim the confining of the frame bolt, G, and the releasing of the same by means of the jointed portion, G, i, the embracing pawls, H H, and release levers, E E, operated by said clocks, as set forth.

We also claim the partial setting back of the independent locking spring bolts, I I, by means of the spring catch, Q, until the closing of the door, as set forth.

SEED PLANTERS—George M. Evans, of Pittsburg, Pa.: I claim so uniting the wheel and guard frame to the leam and to the rods or bars, K, as that the operator may from his position between the handles of the machine, adjust the depth at which the shoe shall open the furrow, by moving said wheel and guard frame forward or back, substantially in the manner and for the purpose explained.

ENGRAVING WATCH CASES, &c.—C. H. Field, of Providence, R. I.: I do not claim two rosettes or irregular discs acting upon two studs for the purpose of determining the length of the line, nor do I claim an eccentric adjusted by the foot of the operator for this purpose.

But I do claim the variable pattern disc, and combination of the same with the stud J, for governing the cutting of the tool.

I also claim the combination and arrangement of the tappets, f' f 2 and the stud, v, also the tappet, b, in connection with the same, for imparting and regulating the motion of the pattern disc

I also claim the arm, E, and the lever, K, and the mechanisms attached thereto, the whole being so combined and arranged as to render the machine self-operating.

Lastly, I claim the adjustable pitman, as set forth, for imparting the required motion to the vertical sliding plate, B.

INKSTANDS—Kingston Goddard, of Philadelphia, Pa.: I claim the application of the bent tube, C, to a common ink bottle, the whole arranged as described, whereby said common ink bottle is converted into an effective and economical fountain inkstand.

BLANK BOOK INDEX CUTTER—George Hodgkinson and T. F. Randolph, of Cincinnati, O.: We do not claim any of the devices separately,

But we claim the arrangement of the machine described for the purpose set forth.

HARVESTER FRAMES—M. G. Hubbard, of Penn Yan, N. Y.: I claim joining the parts of the frame, substantially as described, by means of the lock plates or irons and bolts, so as to make a firm and rigid union between the parts at a small cost, as set forth,

PHOTOGRAPHIC PICTURES, ENGRAVINGS, &c.—S. D. Humphrey, of New York City: I do not claim two photographic pictures, and a reflecting back ground, the rear photographic picture being colored, as the same was patented by J. Bishop Hall, January 20, 1857.

But I claim as an improvement on the said patent of J. B. Hall the use of a semi-transparent media interposed between two transparent photographic pictures or engravings for the purpose of blending the rays of light reflected from the rear colored photograph and beautifying the picture, substantially as specified.

SAW GUMMER—Oliver B. Judd, of Little Falls, N. Y.; I do not claim dressing saw teeth on a circle, as this has been done imperfectly by means of complicated machines.

I claim the method of constructing and arranging the posts, G G, so as to cause the cutter to move in regular curves as described.

ATMOSPHERIC PUMPS—Levi Keiler, of Catawissa, Pa.; I am aware that the elevation of water by condensation of air is not new, and do not claim anything more than the combination of the water receiver, A, and air induction pipe with the valve n, acting with respect to the openings, o and r, as set forth, when said parts are arranged with respect to air condenser and discharge pipe, substantially as described.

BRUSHES OF SAW COTTON GINS—Edwin Keith, of Bridgewater, Mass.: I claim inclining the heads of the brush cylinder from the periphery towards the center and opening the passages, a, through the heads in the manner substantially as set forth,

SUBMERGED PROPELLING WHEELS—Thomas Kendall, Jr., of San Francisco, Cal.: I claim the means described for feathering or changing the positions of the wings, consisting of the cam plates, P, concentric ring, a a, and curved plate, Z Z, with its slopes or planes, the whole being arranged and operating substantially in the manner described.

HARVESTERS—Isaiah Knauer, of Valley Forge, Penn.: I make no claim to the manner of producing the reciprocation, as that is not new,

But I claim the peculiarly constructed close box, B, in combination with guides, G G, and cover C, when arranged to operate in the manner and for the purposes set forth.

STREET SPRINKLER—C. O. Luce, of Brandon, Vt.: I claim the combination of the water reservoir, C, horizontal rotating discharging wheels, H H, operated from the wheels, B B, of the carriage, substantially as shown, and the conveying pipes, I I, provided with the cocks, J J, the whole being arranged as shown for the purpose set forth.

[The common arrangement for sprinkling streets is a perforated tube extending across the back end of a cart, and receiving its supply from a hogshead. This improvement embraces two horizontal wheels secured on the axle of the wagon, and receiving their water from the reservoir. As the cart is drawn along, these wheels revolve, and sprinkle the streets by water thrown out by centrifugal action. The quantity of water supplied to the wheels is regulated by cocks.]

CHURNS—H. N. Mackey, of Morgantown, Va. I claim the combination of the oblique wings with the double-headed self-acting pistons passing through them, operating as and for the purposes set forth.

REVOLVING LAST HOLDERS—Benjamin Marshall, of Philadelphia, Pa.: I claim nothing in the idea of a revolving arm and shaft, or a holder combined with it and the last attached.

But I claim, first, the screw, V, and nut W, in combination with the inclined plane, U, for the purpose of raising and lowering the toe-rest, L, and moving it back and forth, all arranged in the manner substantially as set forth.

Second, I claim the combined arrangement of the crank or eccentric, R, with the revolving shaft, F, and the attachment of the elastic band, S, or its equivalent at the wrist, l and t, the set screw, f, substantially as described.

OIL PRESS BOXES—Wm. W. Marsh, of Jacksonville, Ill.: I do not claim generally the use of longitudinal guides or flanges at the sides of the trusses to guide the boxes to and from the trusses, and keep the hinged side of the boxes closed.

But I claim the employment upon the upper sides of the trusses, of the longitudinal guides, B B, of such form, substantially as described, that while they serve to conduct the boxes to and from the press, and to confine the hinged sides against the outward pressure, they also serve to connect the trusses with the boxes for the purpose specified.

[This invention relates to vertical oil presses. The upper sides of the trusses are furnished with guides so formed that while they serve to guide the boxes into and out of the press, they also connect the trusses with the boxes immediately above them in such a manner that the weight of the trusses aids in drawing the boxes of the pistons which operate in them, thereby opening the press, when the ram is allowed to return after having pressed all the oil out the meal—a good improvement.]

PAINT CANISTERS—J. W. Masury, of Brooklyn, N. Y.: I claim the use of metallic cans for putting up paints or other substances of any known form, with ears attached thereto through which a wire bail may be passed in such a manner as not to interfere with the packing of the cans, and to render it at once a package for transporting the paint, and a convenient and useful pot or pail out of which to use the same, with a removable cover secured to the can, in the manner and for the purposes described and represented.

PHOTOGRAPHIC BATHS AND PANS—George Mathiot, of Washington, D. C.: I claim to construct the baths and vessels for photographic uses of an impervious substance formed by the combination of a cement with an earthy matter or its equivalent; and also to form the the bath or other vessel by first forming the vessel of unglazed pottery or its equivalent, and making the pottery impervious by saturating it with wax, gum, balsam, resin, pitch, stearine or siccative oil, or other equivalent for any one of these.

COP-TUBES—John Marland and Earlsworth Crockett, of Lawrence, Mass.: We do not intend to limit ourselves to the precise method described of forming the tubes.

We lay no claim to the machine upon which the tubes are made, as that forms no part of our invention.

We claim a cop-tube formed of gutta percha prepared in the manner substantially as set forth for the purpose specified.

SAILS AND RIGGING OF VESSELS—George T. May, of Tompkinsville, N. Y.: I am aware that boats and small vessels having one or more masts unsupported by rigging, and depending for support upon the hull, have been fitted with sails that have or may have a full semi-circular sweep, and I do not, therefore, claim broadly the use of a sail having such sweep.

But I claim the use of a self-supporting "set" of masts, whether the same is composed of two or more masts, they being stayed and sustained by rigging whose spread at the line of the deck shall not exceed the lines of the distance between the forward part of the pivot mast and the forward part of the spring mast of the set, as set forth.

WASHING MACHINES—Josiah Mayes, of Cohoes, N. Y. I do not claim the beaded strips, d g, irrespective of their peculiar position and arrangement, as shown, for they have been previously used.

Neither do I claim a rotating reciprocating rubber placed within a tub, for they are well known and in common use.

But I claim attaching the beaded strips, d g, to the bottom, E, of the tub, B, and the face of the rubber, C, substantially as shown and described, for the purpose set forth.

TEMPERING STEEL PLATES—Henry A. Seymour, of Bristol, Conn.: I claim the employment of the perforated plates, D D, and the water cooling boxes, B B, substantially in the manner and for the purpose as set forth.

BOMB LANCES—Rufus Sibley, of Greenville, Conn.: I claim causing a bomb lance or projectile to take the wings that are to guide it through the air or water, from the muzzle of the gun from which it is discharged, substantially in the manner set forth.

I also claim sloping the muzzle of the gun so that the wings may come back and close down to the barrel, substantially as set forth.

EXCAVATOR—Samuel W. Soule, of St. Louis, Mo.: I claim the frame, d, lever, d', lugs, g h, rod, i, and pins or lugs, j and j', and projection, k, or their equivalents, for the purpose of mechanically operating a scraper, as described.

TENONING BLIND SLATS—Lafayette Stevens, of Elmira, N. Y.: I claim the movable and reversible gage, D, as described, in combination with the sliding table, C, arranged and operating in connection the mandrel head, I, as made, and cutters, k, and spur, b', as described, and for the purpose set forth.

SELF-ADJUSTING SACK HOLDER—Augustus Stoner, of Mount Joy, Pa.: I claim the spring, G, and the adjustable base, F, by means of the screw and burr, H, and piece, c, and the hopper, D, when combined, substantially as set forth.

CONSTRUCTING LETTERS FOR SIGNS, &c.—Thomas Motley, of Brooklyn, N. Y.: I claim the new manufacture of frame or skeleton letters described, that is, the outline of each letter or numeral is formed of a skeleton frame, open both front and back, or entirely through, as shown.

WINDMILL—Rufus Nutting, of Randolph, Vt.: I claim the construction of a horizontal wind power, with a regulator or clasp, operated by centrifugal force, which shall regulate the amount of surface of wing or sail opened to the wind, substantially as described.

Also an arrangement by which the regulator or clasp may be conveniently set at any time by the operator, in such position as to prevent the wings from opening too far, or at all, as is desired.

SETTING HEAD-BLOCKS OF SAW MILLS—Ira Robbins, of Unityville, Pa.: I claim the combination of the lever catch, S, spring, S', cords, p p' and g, weight, r', stud, t, and lever, L, in connection with the lever, K, operating as and for the purposes described.

PLANING HOOPS—Thaddeus S. Scoville, of Elmira, N. Y.: Machines with rotary cutters have been used for dressing hoops.

India rubber feed rollers and elastic guides have been used; these I do not claim.

But I claim the employment of a concave guide, c c, arranged with a hinged portion immediately before the cutters, which is held in place by a spring having less pressing force than the counter gage roller, E, in combination with said gage roller, or its equivalent, substantially in the manner and for the purposes set forth.

WINDING WADDING—Thomas Thompson, of Niverville, N. Y.: I claim the apparatus substantially such as described, for removing the full roller, and supplying or depositing the empty roller, or the equivalent thereof, for the purposes substantially set forth.

I also claim the devices covered by the first claim or their equivalents, in combination with the rollers arranged to divide or break the wadding or other material wrought, substantially as described.

RAILROAD CHAIR MACHINES—Corydon Winch, of Jersey City, N. J.: I am aware that a number of machines have been devised for making railroad chairs from wrought iron, and dies operated by cams, or their equivalents, have been used and arranged in various ways in connection with cutters, benders, &c. I therefore do not claim separately, or in itself considered, either of the parts described, irrespective of the peculiar construction and arrangement of the same.

But I claim the two bending and upsetting arms or bars, Q Q, having their upper surfaces made inclined, and provided with ledges or flanches, k k, at their inner edges, the bars being operated or moved, as shown and described, so as to both bend and upset the lips, a, and thereby increase the thickness, and consequently the strength of the lips where most required, viz., at the junction of the lips with the plate or base of the chair.

[This machine has dies, cutters, punches, beveling and upsetting arms, a drop mandrel, and a clearing device, so arranged and operated that the wrought iron railway chairs are formed in a very perfect manner at one continuous operation, from bars.]

SKATES—John A. Winslow, of Roxbury, Mass.: I claim the application of a second metal runner to the skate, which being placed on the bottom outside of the central line of axis, and the runner in the ordinary skate which lies along that line removed to a correspondent position on the other side, completes the improvement.

WASHING MACHINES—Henry D. Youry, of Junius, N. Y: I claim the mode of operating the apron, 6, to give its surface a slower motion than the surface of the rubber, 5, in combination with the shaft, 8, and apron, 6, the side plate and hook, 13, constructed and operated in the manner and for the purposes set forth.

PURIFYING OILS—Halvor Halvorson, of Cambridge, Mass., (assignor to himself, Edward H. Baker, J. F. Athearn, and W. Tracy Eustis, of Boston, Mass.): I do not claim clarifying oils by means of caustic lye, and subsequently washing out the stearine soap by means of alcohol.

But I claim in the process of manufacturing or purifying oils, the employment of alcoholic solutions of alkali, in the manner substantially as set forth.

REVERSING THE CHISELS OF MORTISING MACHINES—Moses Marshall, (assignor to himself and Russell Dyar,) of Lowell, Mass.: I claim the projection, c, on the pawl, J, so constructed and arranged as to press back the bolt, H, when moved in one direction and release the collar, G, so that it may be turned by the pawl, J, to reverse the chisel, and also that it (the projection c,) will pass outside of the pin, e, when moved in the other direction, substantially as described for the purpose set forth.

I also claim the slotted lever, Q, chain, O, and lever, U, or their equivalent, so constructed and arranged as to turn the collar, K, and reverse the chisel, as described.

ANCHOR TRIPPERS—John B. Holmes, (assignor to himself and John R. Pratt,) of New York City: I do not claim the various parts when separately considered

But I claim the combination of the thread or screw, E, working in a spiral groove or nut with the shaft or bolt, D, when arranged in the manner and for the purpose substantially as described, whereby I am enabled to relieve the chain and trip the anchor at an instant, in the manner set forth.

MAKING PAPER BAGS—Benjamin F. Rice, (assignor to Benjamin R. Smith and Charles H. Morgan,) of Clinton, Mass.: I claim a combination or machine composed of machinery for bending a strip of paper around a former, e, and into a tubular form, so that one edge may be lapped over the other, as described; machinery for pasting such edges, or one of them, and closing or pressing them together, and machinery for cutting the tube crosswise, as described.

I also claim the combination of machinery for bending a strip of paper around a former, e, and into a tubular shape, so that one edge may be lapped over the other, as described, machinery for pasting such edges, or one of them, and pressing them together, machinery for cutting the tubes slantwise, as specified, while it is on the former or holder, and machinery for pasting or cementing the said tube near its front end, and bending or lapping the end of the tube on the cemented part, so as to form the bottom of the bag, and discharge said bag from the machine, as specified.

I also claim arranging the pitch line of the feeding gear, w2, in or about in the prolongation of the axis of the shaft of its crank, whereby we obtain intermittent and variable motions of the paper, as described.

I also claim arranging and operating the cutting knife with respect to the former, e, so as to cause said knife to cut obliquely across the end of the former, and through the tube of paper, as set forth.

I also claim the combination of the paster, the presser, and bending and discharging rollers or their equivalents, the whole being made to operate together, substantially as described.

I also claim combining with the rollers, m n, the mouth bars or scrapers, i2 j2, applied thereto, in manner and for the purpose as stated.

I also claim the improved construction of the cutting knife, viz., with a serrated edge beveled, substantially as set forth.

GAGES FOR CASKS—John W. Cochran, of New York City: I do not intend to confine myself to this particular manner of constructing my gage, but in any way, so long as it is substantially the same in effect.

I claim, first, the arrangement of the sliding plungers and set screws in relation to the connecting rods and measuring arms, by which I am enabled to work each arm independent from the other and gage casks or vessels, whether the bung hole is in the center, in the head, or elsewhere.

Second, I claim making the measuring arms adjustable, as set forth.

SPLITTING WOOD—Waterman L. Ormsby, of Jersey City, N. J.: I claim, first, the arrangement of the chisels in broken or serrated, and in diagonal lines, according to the nature of the wood to be split.

Second, the arrangement by which the apices of one row do not coincide, but alternate with those of an opposite row.

Third, the feeding apparatus and clamp, inclined as represented, by which sticks put into the feeding boxes require no further attention or handling till they drop as kindling wood from the splitting chisels.

Fourth, the combination of the feeding, sawing and splitting apparatus, substantially as described, by which greater economy of time and power in preparing kindling wood is achieved than has been hitherto attained.

I also claim, fifth, the combination of the guide grooves in the flanch of the hopper, thereby avoiding the introduction of separate guide plates for the chisels.

RE-ISSUES.

MILL FOR RE-SAWING BOARDS, &c.—Pearson Crosby of Fredonia, N. Y. Patented Nov. 8, 1841; re-issued March 10, 1849; extended Oct. 30, 1855. I claim the mode of operation substantially as described of gaging, guiding, and presenting boards to the action of a saw, which mode of operation results from combining with a slitting saw the mechanism substantially as described, for gaging and guiding one face of the boards, and the mechanism for making a self-adjusting pressure, substantially as described, on the opposite face of the boards so that the boards will be clamped between the two said mechanisms on opposite faces, and immediately in front of the cutting edge of the saw, so as to present the gaged face of the boards, however warped or bent they may be, in a plane parallel with the plane of the saw, as set forth.

And I also claim, in combination with a slitting saw, and the arrangement of the gage and pressure rollers, substantially as described, connecting the said gage and pressure rollers with the mechanism from which they derive motion by means of universal joints, substantially as and for the purpose specified.

And I also claim the method substantially as described of hanging and straining the saw, by the combination of the three stirrups at the ends of the saw, constructed and connected in the manner substantially as described.

GAS BURNERS—Charles H. Johnson, of Boston, Mass.: I claim elevating the orifice of injection, a, above the base of the burner, by means of a cone, or its equivalent, raised on said base, and into the chamber of the burner up into the distributor or among its wires, as described, in order that advantages as stated may be attained.

Passenger Coal-Burning Locomotives Successful.

Coal-burning locomotives have been very successful as freight engines; but to use bituminous coal—the most abundant in the West—they must be able to burn their smoke, or they will not answer for passenger engines.

The locomotive which was illustrated and described on page 160, this Vol., SCIENTIFIC AMERICAN, which burns its smoke, has been quite successful as a passenger engine. A copy of the Chicago *Times* of April 16th comes to us "marked," containing an extract, in which it is stated that two such locomotives, built by Mason & Co., Taunton, Mass., have been put on the Illinois Central Railroad, to burn the common coal of that State. Respecting the last engine put on, the *Times* says:—

"Not discouraged by some difficulties met with in introducing the first engine, they have put on a second, and this has run the passenger train between Chicago and Urbana for a fortnight past, probably not one passenger out of fifty knowing that the engine was burning coal. To test the machine more completely several of the officers of the road left Chicago last week for Cairo, thence to Dunleith, and back to Chicago, via Mendota—a grand circuit of 1,044 miles, run with one engine; and the whole was performed without the slightest delay or accident, or any failing in the tireless steed. The consumption of coal during the trip was six tuns. This experiment is the most successful of those which have yet been tried with Illinois coal, and the result is likely to be of the greatest importance in railroad economy."

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Electricity and Lightning Rods.

MESSRS. EDITORS—That a pointed metallic rod will become illuminated at its point with fire when near a body of plus electricity, and that a metallic knob in the same position will receive a spark of electric fire, is not to be doubted, but these effects will only ensue when the distances between these media are within limited spheres of space. When an electrified cloud passes a thousand feet above the top of a house, and in passing over it explodes its electricity, and that house has a lightning rod projecting eight or ten feet above its apex, will said house be exempted from the electrical discharge by virtue of its rod? From the acknowledged science of electricity and its known effects it will not. There is a church-steeple two hundred feet high standing in this city, with a lightning rod from spire to the moist earth below, and twice has this steeple been struck with lightning, and on one of these occasions the lightning rod was fused some distance below its point, and twisted like a corkscrew.

That a kite elevated with a conducting cord and points will bring down a stream of electricity, or that a lightning rod will do the same, at times, does not prove that objects on the earth, where these conductors terminate or pass through, are free from thunderbolts. They would only be free from the contingency of an explosion occurring at the place where the kite rested, and where the rod point terminated above, taking in a sphere of protection in proportion to the amount of attracting surface presented by these points, which would be verylimited indeed. At an hundred or five hundred feet from these points an electrical explosion may occur, and its bifurcations and zig-zags may drive right into the buildings whereon these lightning rods stand, as was the case in the church steeple, as also in the Rev. Mr. Thom's house in Carlisle, Pa., both of which I witnessed.

I have examined five buildings struck by lightning, three surmounted by lightning rods, and two without them, and those with rods fared no better than the others. In observations through Lancaster county I find that rod protection has no margin in its favor when fairly estimated; and so well aware of this fact are the sect of Menonists that they discard them altogether in their church discipline, in the belief, however, that if God chooses to send bolts, lightning rods are of no avail—a kind of doctrine you must not understand me to promulgate.

The nice little demonstration with the 'thunder house," in electrical experiments in schools, no more proves the exemption of buildings surmounted with rods from electrical discharges in the clouds than it proves that said "thunder house" electrical machine and gas bladder are correct representations of the condition of thunder cloud explosions and the objects struck by them. In the "thunder house" the explosion or spark upon the knob is a primary effect, while in the case of the thunder-bolt from the clouds it is a secondary effect. It is only where the point of the rod penetrates the opposing electrical mass that it can conduct and discharge silently into the earth the pending explosion; and in ordinary thunder storms the rod would have to pierce the cloud region to be a protection to the building. The rod cannot shield the building from the effects of a bolt any more than it could shield the building from a cannon-ball after it was in motion. The electrical cannon must be spiked to make it harmless. In all my observations I find that the most prominently projecting objects have been the recipients of electrical discharges, rod or no rod, where they have been in the vicinity of the descending shaft. JOHN WISE.

Lancaster, Pa., May, 1857.

[The tenor of Mr. Wise's communication is, that lightning rods do not afford protection to buildings from disruptive electrical discharges. Now there is certainly good evidence on record that they have protected buildings. The Dutch church in this city was twice struck with lightning—once in 1750, and again in 1763—damaging the building. In 1765 a conductor was applied; in that year there fell upon it a heavy stroke of lightning, but the building was not the least injured. The great tower of St. Mark at Venice, 340 feet high, was nine times struck by lightning, and nearly reduced to ashes on more than one occasion. A lightning rod was applied in 1766, since which time it has not suffered in the least. Numerous instances of the same kind might be given. We are aware that a number of houses provided with conductors have been struck with lightning, but we have been led to believe that their conductors were rendered ineffectual by some defect in their construction.

Product of Gold and Silver in the World.

Inventors, we know, have much at heart in their inventions regarding the benefit which will grow out of them for mankind. Gold and silver, however, are not in contempt with them; therefore the following statements may be of some interest, as they are of recent date:

Europe yields yearly, 26,805 kilogrammes of gold, 161,144 of silver, value, $25,000,000; America yields 169,834 kilogrammes of gold, 755,180 of silver, value, $146,000,000; Asia yields 27,000 kilogrammes of gold, 110,000 of silver, value $22,000,000; Africa yields 4,200, no silver, value, $2,600,000; Australia, yields 282,360 kilogrammes of gold, no silver, value, $200,000,000. Total of gold, 510,199 kilogrammes, silver, 1,026,224, total value of gold and silver, $395,600,000. The whole value of noble metals from olden times to the present day is $20,536,000,000. From the beginning of the world to the Christian era, $4,328,000,000. The amount of 1856 years, $16,204,000,000.

At the ratio of the present yield, it would require only forty years to reach the above amount. L. K. BREISSACH.

Lead Discoveries.

MESSRS. EDITORS—There has been discovered inexhaustible lodes of lead in this (Newton) county, and although the first discovery was made only about two years ago, there are already about 4,000 persons now at the mines seven miles east of this, and the quantity of mineral they are bringing to the surface of mother earth is truly astonishing. It is not unusual for two men to raise 10,000 lbs. per day; price of mineral at the furnace, $20 per thousand pounds. We have three furnaces now in operation, smelting about 15,000 lbs. of lead per day; two or three more are in course of erection, and will shortly be in blast. Capital is wanted very much, machinery is wanted, everything is wanted but lead—that we have an abundance of.

We are about two hundred miles from the river, and thousands of wagon loads of lead must be hauled there before our railroad is completed; this is a great drawback, but it cannot be helped. When the railroad is finished to this place it will be the garden-spot of the great West. H. S. CHENOWETH.

Neotho, Mo., May, 1857.

Cement Tan Vats.

MESSRS. EDITORS.—Hydraulic cement tan vats are used successfully in this section, when kept from freezing. They are soon coated with a sort of slime, which prevents the tannin from producing much effect on the cement. No bad effect is produced on leather.

R. B. ODELL.

Fulton, N. Y., April, 1856.

Adulterated Liquors.

Dr. Hiram Cox, chemical inspector of alcoholic liquors in Cincinnati, states, in an address to his fellow citizens, that during two years he has made 240 inspections of various kinds of liquors, and has found more than nine-tenths of them imitations, and a great portion of them poisonous concoctions. Of brandy he does not believe there is one gallon of pure in a hundred gallons, the imitations having corn whiskey for a basis, and various poisonous acids for the condiments. Of wines not a gallon in a thousand, purporting to be sherry, port, sweet Malaga, &c., is pure, but they are made of water, sulphuric acid, alum, Guinea pepper, horse radish, &c., and many of them without a single drop of alcoholic spirit. Dr. Cox warrants there are not ten gallons of genuine port wine in Cincinnati. In the inspections of whiskey he has found only from 17 to 20 per cent. of alcoholic spirit, when it should have 45 to 50, and some of it contains sulphuric acid.

Notes on Science and Foreign Inventions.

Mr. Mappin, of Birmingham, has patented a new panel for resisting burglarious attempts. It consists of a composition, inclosing a thin plate of steel. In making a full-sized panel he says, the steel would not be in one piece the size of the panel, but as a series of strips, 1 1-2 inch broad, inserted at intervals, leaving a space of three-quarters of an inch between each. The patentee considers that it affords a perfect resistance to sharp instruments used by burglars, that panels made of this material will never shrink or twist, and that it is well adapted for curved panels.—*London Builder.*

[Chilled cast iron wouid be as good as steel for such panels, and certainly much cheaper.

Iron and Steel.—A patent has been taken out by Robert Mushet, of Coleford, Eng., for the following improvement in the manufacture of the above-named metals:—

For the purpose of remedying or diminishing as much as practicable the defects observed in purified cast iron decarbonized, or partially decarbonized, by causing air to pass through it amongst its particles whilst in a fluid state, and in order to convert it into iron or steel possessing such a degree of malleability, ductility, and tenacity as shall render it commercially valuable, the patentee proceeds in the manner following:—When he intends to produce malleable iron he purifies the cast iron, and decarbonizes it thoroughly, or nearly so; he then adds to it a quantity of metallic manganese, varying from one quarter of a pound to two pounds, by weight, for every 100 lbs. by weight of purified cast iron, and adds the metallic manganese to the molten purified iron. When he intends to produce cast steel he sometimes arrests the purifying process, so that the cast iron may not be wholly decarbonized, but merely decarbonized until it shall contain only such a proportion or percentage of carbon as to constitute cast steel, and he then proceeds to add the metallic manganese to the molten cast steel in the manner before described.

Lighting Mines with Gas.—Mr. A. Wright, England, has taken out a patent for an improvement in apparatus for lighting coal and other mines with gas, to supersede the use of oil, now used for this purpose. The gas is manufactured above ground at the summit of the mine, and is forced through pipes down the shaft into all the working rooms and along the roads, by pressure. Mr. Wright employs a governor on the main pipe of the gas reservoir, which regulates the flow of the gas to the mine, as required. In mines where there is no danger from fire-damp, each miner wears a small oil lamp hung on the front of his cap to give him light; these lamps are inconvenient and troublesome. If gas can be substituted with safety for them in any mine in our country, it ought to be done. We have been informed that some of the mines in England are already lighted with gas.

Electricity.—Pierre A. Le Comte de Fontaine Moreau, of Paris, has secured a patent for a novel arrangement of plates in a galvanic battery. He employs a solution of sulphate of potash as the exciting liquid, and places the copper plate partly in and partly out of it (the liquid) so as to be exposed to both the air and liquid, while the zinc plate is entirely immersed in the solution, and at a short distance from the bottom of the vessel. He asserts that by this arrangement of plates the tension of the current, as indicated by the galvanometer, is 34 degrees, while by immersing the copper plate entirely it is only ten degrees.

Anthracite Coal Coke.—The patented process of Mr. Tardieu, for the economic conversion of small (or slack) anthracite into a very superior coke, for locomotive and metallurgical purposes, is attracting considerable attention in France. Experiments to the extent of upwards of 400 tuns have been successfully made in different parts of France, the product being, in every case, an excellent coke, possessing more carbon and freer from earthy matter than that made from the bituminous coal. The process simply consists of the mechanical admixture, previous to coking, of small anthracite with pulverized bituminous coal, in the proportion of four-fifths of the former to one-fifth of the latter. The yield of coke is upwards of 80 per cent. while the average yield of that from common French bituminous coal is under 60 per cent. The superiority of this coke for metallurgical purposes has been conclusively established by a series of experiments at the important iron works of Commentry, and its availability for locomotive purposes is now being tested on the Western Railway of France.

To Make Berlin Fine Castings.

To produce such castings in iron, it is necessary in the first place to have a perfect pattern, brass being generally preferred for this purpose; in the next place, the pattern must be accurately molded. In order to accaccomplish this, a fine close sand is required, (perhaps Waterford sand would answer,) which must be partially dried and sifted through a fine sieve. When the pattern has been molded and withdrawn from the mold, the latter is dusted over with fine brick dust made from fresh burnt soft brick. The pattern is now dried, carefully returned to its place in the sand mold and rapped home with a wooden mallet, and again withdrawn. If the mold has been sufficiently dusted, it will have a surface as fine as the pattern. The mold or flask is now put in a stove and dried. Before it is quite cold, it receives a coat of lamp black, by putting some oil in an open dish, and using a large wick so that it will burn with considerable smoke. The mold is now held over the smoking oil until it is sufficiently coated with lamp black; when this is accomplished, the flask is closed, clamped or screwed together, and is then ready for the molten metal. This is the way the fine Berlin castings are made. I have seen quite a number of these castings made in our country, by a Berlin workman, who was in my employ. A SUBSCRIBER.

Printing in China.

In Montgomery Martin's work on China, he says:—

"According to the best authorities, the art of printing was known in China upwards of 900 years ago. In the time of Confucius, B. C. 500, books were formed of slips of bamboo; and about 150 years after Christ, paper was first made; A. D. 745, books were bound into leaves; A. D. 900, printing was in general use. The process of printing is simple. The materials consist of a graver, blocks of wood, and a brush, which the printers carry with them from place to place. Without wheel, or wedge, or screw, a printer will throw off more than 2,500 impressions in one day. The paper (thin) can be bought for one-fourth the price in China that it can in any other country. The works of Confucius six volumes, 400 leaves octavo, can be bought for ninepence (18 cents)."

The "Red Sea" Green.

The general opinion respecting the color of this sea has been that it was of a red hue, but, like many other popular notions this has been a popular fallacy. Horatius Bonar, D.D., in his work on the Holy Land, says:—

"Blue I have called the sea, yet not strictly so, save in the far distance. It is neither a red nor a blue sea, but emphatically green—yes, green of the most brilliant kind I ever saw. This is produced by the immense tracts of shallow water, with yellow sand beneath, which always give this green to the sea, even in the absence of verdure on the shore or seaweeds beneath. The blue of the sky and the yellow of the sands meeting and intermingling in the water form the green of the sea, the water being the medium in which the mixing or fusing of the colors takes place."

Cure for Chronic Rheumatism.

The London *Lancet* contains the history of a series of cases of this disease treated successfully by Dr. O'Connor, one of the physicians of the Royal Free Hospital, in a number of cases under his care, by the use of sulphur and flannel bandaging.

Near Baton Rouge, La., a fissure has opened in the earth to the extent of several hundred yards in length, and about twenty feet in depth. Smoke, impregnated with a sulphurous smell, issues from the fissure in clouds.

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New Inventions.

Improvements in Sculpture.

The London *Atheneum* gives an account of some new inventions of our countryman in Italy, Hiram Powers, the sculptor, in the art to which he has added so much renown by his genius and skill. Thus, in finishing the limbs of his figures with that extreme nicety for which he is celebrated, Mr. Powers adopts the following bold and novel mode :—He has invented a vise, which is set upon a ball and socket joint, and has, by virtue of raising and depressing screws, every possible variety of motion. This instrument is said to be the perfection of ingenuity.

Electrical Protection of Metals.

We stated in our last number, that according to the law of electrical affinities, when two oxydizable metals are connected together and exposed to a moist atmosphere or water, the negative is protected at the expense of the positive. Thus iron, which is very liable to oxydize, is prevented from rusting when connected with zinc, because the latter metal is more oxydizable, it is positive, the iron negative. On the other hand, when iron is connected with copper or lead, it rusts more rapidly ; it is the positive metal when thus related. Iron may be used as the positive metal, as well as zinc, for a galvanic agent, and we understand it is so used in what is termed "the Maynooth battery," but it is inferior to zinc for such a purpose. Sir Humphrey Davy was the discoverer of this law, and he entertained great hopes of its being so applied as to protect the sheathing of ships *permanently*. Iron lightning rods have been protected from rusting by connecting them at the foot with pieces of zinc placed in the moist earth. The wrought iron bolts, &c., of water wheels have been prevented from rusting by being connected with strips of zinc, which were easily renewed from time to time This application of the law of electrical affinities is very useful for protecting the iron of various machines or articles that may be exposed to water or a moist atmosphere.

Iron appears to undergo no change in dry air, and is incapable of decomposing pure water at ordinary temperatures. In the ordinary rusting of iron a hydrated sesquioxyd is formed. Iron rust always contains ammonia, In solutions of the alkalies, and in lime water, iron remains bright, these appear to protect it from rusting. All acid salts, on the other hand, rust it rapidly. These facts should not be overlooked by those who employ steam boilers, they should use pure soft water, and no other kind for generating steam.

Machine for Paging Books.

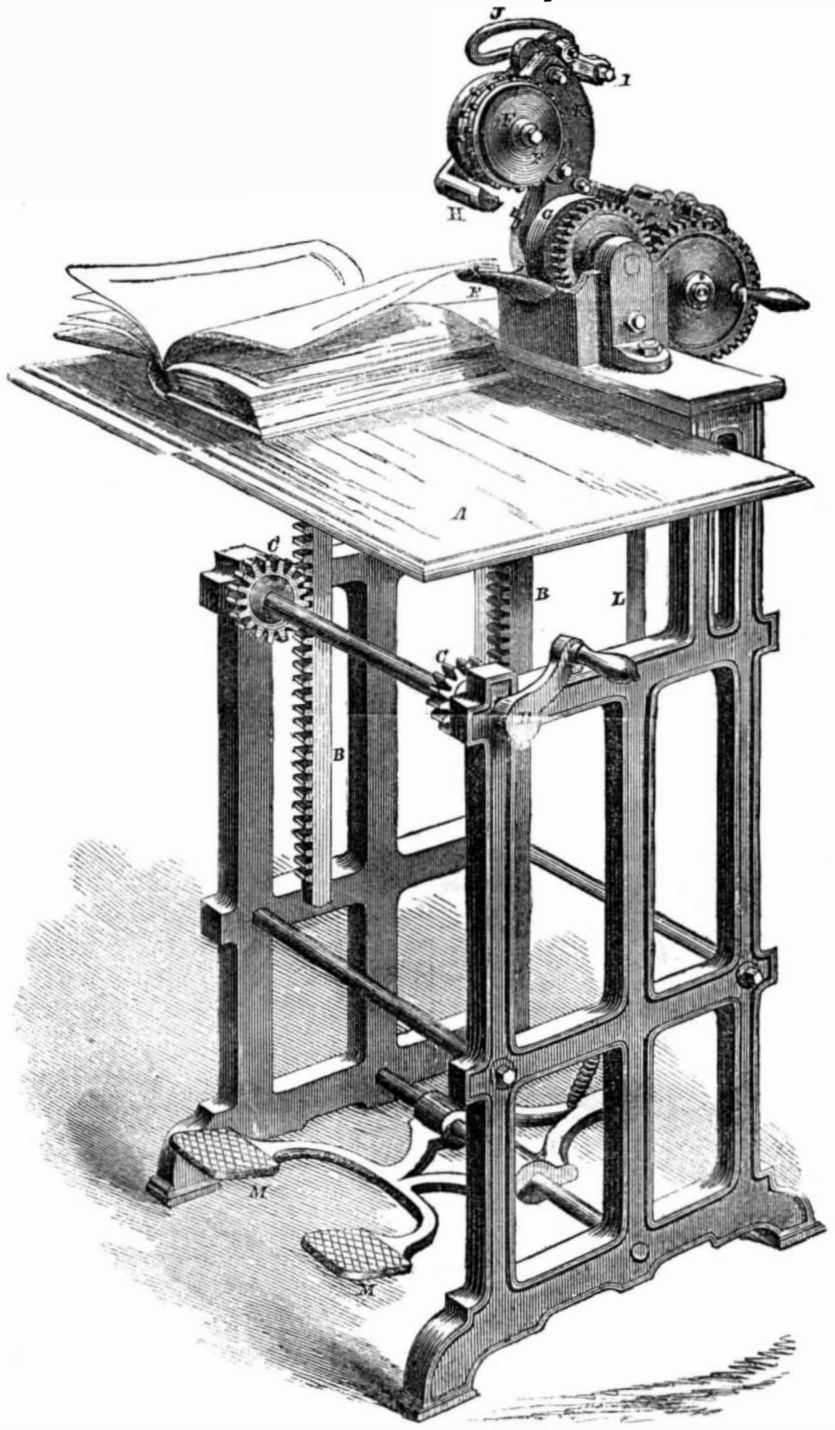
There are several machines in use for printing the proper figures on each page of blank books, but the one here illustrated possesses some advantages peculiar to itself. It was invented by F. O. Degener, of this city, to whom Letters Patent for a paging machine were granted July 24, 1855.

This machine, as also every other intended for the same purpose, requires the leaves to be separated by hand, and to be presented in turn on the bed or platen to receive the impression. With this exception, the operation is entirely automatic, the changing of the figures and the inking of the same after each impresson being admirably and perfectly performed. The machine may be worked by power if desired, but is here shown as working by the foot lever, M.

A is the table of the machine, on which the book is laid. B B are racks attached thereto. C C and D represent very obvious means of raising and lowering the same. E is a small flat platen, made suitably soft at its upper side to receive the impressions, and provided with suitable gages to aid in laying the corner of each leaf in the same position as its fellows, so that all the figures shall appear at the same distance from the corner of its respective page.

F is the wheel carrying the figures, and is pressed down upon E at each movement of the foot lever, M. This wheel is compounded of a number of disks, capable of revolving independently of each other, but ingeniously connected by pawls and notches, so that each moves the next, one notch, at each complete revolution. The motion of these disks is analogous to those of ordinary counting devices, and results in changing the number printed by one unit at each impression. The first disk represents units, and turns regularly one-tenth of a revolution after each impression, and after having presented its figure 9, presents 0, and gives a movement of one notch to the next disk, after which the disk representing tens remains stationary, until the unit disk has completed another revolution, when it starts along another notch. When the second disk has thus slowly completed a

MACHINE FOR PAGING BOOKS.



full revolution its next step moves the third disk one notch, and so on, to any extent required. Four figures, will, of course, include any number up to 9999, which is more than is ever required in practice.

G is a roller supplied with ink in the usual manner from other rollers. The ink is distributed at first by grasping the crank represented, and turning it for a short period; but after the machine is in operation G is partly rotated at each motion of the foot, so that the crank is unnecessary. The compound wheel, F, is carried in the stout lever, K, and derives its motion from a connection of the latter to the foot lever, M, by the link or rod, L. The part denoted by J is not fixed to the lever, K, but is a portion of the stationary framing of the machine, and as K vibrates, an arm of the lever, I, travels in the crooked slot represented in J, and moves the small inking roller attached to I, first allowing it to rest on G, and turn with it to receive ink therefrom, and then as the wheel, F, rises, moving rapidly forward, and applying the adhesive coloring matter to the types or raised figures, and again withdrawing, ready for the next impression.

The machine is represented to be capable of working easily at the rate of 1,500 pages per hour, and can, of course, number checks, bills, tickets, or other sheets or cards, with the same facility.

Further information relating to the same can be obtained by addressing Messrs. Doane & Co., 96 Fulton st., this city.

Choosing Printed Paper for Walls.

Most persons when they go into a store to purchase paper for the walls of their houses are never satisfied unless they overhaul a great number of patterns. Their object is to select the *prettiest* style they can find—the best among the lot—and this course, in ordinary business, has a common sense appearance about it. But a rule of conduct, excellent and correct in the pursuit of one object, may be totally wrong in following after that of another, and this is the case in examining a great number of samples of printed paper at once. Many are so liable to get bewildered when a great variety of patterns are passed before them, that they frequently choose the poorest design of the lot. This is not surprising; indeed, it is in exact accordance with the laws of vison. It has been conclusively shown by M. Chevreul, the distinguished chemist in Paris, that the eye, in looking at color after color, is gradually undergoing change, so that the character of each color is altered; in short, the color is vitiated. An analogous result is unquestionably produced in the form of the patterns, as well as in their colors and proportions. The best way to select good and agreeable patterns of paper, therefore, is to examine only a few at once.

When Patents Expire.

A patent taken out in any foreign country and afterwards secured in the United States, expires with the foreign patent. This is according to our patent law. From a communication we have received on the subject we are convinced that many persons are not acquainted with this feature of our patent code. The English patent of E. P. Morewood for galvanized iron, mentioned in our last issue, expired on the 3d inst., thirteen years only from the date of his American patent, but fourteen from May 3d, 1843, the date of the English patent.

Elevators for Steamboats.

The Pittsburgh (Pa.) *Journal* states that Robert Lea, engineer of that city, has constructed an elevator for the steamer *City of Memphis*, for lowering into and raising cargo from its hold, and it has been found very convenient. It is rigged in the hatchway, and occupies the whole space, except about two feet, sufficient for a plank on each side for walking up and down. It consists of endless chains, which revolve on two rollers, attached to each end of the frame, at the deck, and in the hold. On these endless chains, or belts, at regular distances, are fastened cross pieces of wood, to support barrels ascending or descending, and the machine is kept continually in motion by the engine, or can be worked by hand.

In the hold, at the base of the elevator, where the freight is removed, or put on, as the case may be, is erected an inclined plane down which the goods are taken by men when loading, or up which they are rolled and dropped on the belt, when unloading the boat. And on the deck likewise, are planks placed, a little above the belt, forming a gentle declivity towards the gangway. The hatchway, instead of being open, as a trap for the unwary, is cased with doors in front.

No such elevator, so far as we know, is employed on any of our steam or sailing ships, and we think it would be a great improvement if they were all to adopt it. Our common passenger river steamboats do not require them, as they carry their cargoes on deck and have no hold room. Elevators for unloading grain from vessels are in common use, but they are different in their construction from the one on the *City of Memphis*.

Machine Horse and Mule Shoes.

Messrs. Burden & Sons, iron manufacturers at Troy, N. Y., have concluded a large contract with the Government to supply the horse and mule shoes used in the United States service. These shoes are to be made by a machine, which turns them out at the rate of fifty a minute, or ten tuns a day. They are swedged between dies, and are as uniform in weight and form as coin.

Iron Ships with Iron Rigging.

The Baltimore papers state than the British iron ship *Santiago* has recently arrived in that city from Africa. She is a clipper of fine model, and besides the hull being of iron, the rigging is mostly composed of wire ropes. The compass is placed on the mizzen topmast, to prevent local attraction, and the top sails can be furled by the men on deck.

Varnish for Rustic Garden Seats.

First wash the woodwork with soap and water, and when dry do it over on a hot sunny day with common boiled linseed oil; leave that to dry for a day or two, and then varnish it once or twice with what is commonly termed "hard varnish." If well done it will last for years, and will prevent any annoyance from insects. Now is the time for varnishing such seats

American Balance Docks in Austria.

The Austrian Government, convinced of the superiority of our balance and sectional docks, intend to erect such structures for its navy, and J. S. Gilbert, of this city, inventor of the balance dock, is employed at Trieste in building one.

Obed Hussey's Reaping Machine has been introduced into New Zealand by an Englishman, and has been used with gratifying success.

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Scientific American.

NEW YORK, MAY 9, 1857.

Strains on Material.

There are infinite varieties of strains, but all are reducible to, or compounded of, five classes:—

First, The tensile strain, or fair pull, that to which ropes are commonly exposed. This is that to which most material can oppose the greatest resistance.

Second, The shearing strain, that to which pins in machinery, or constructions of any kind, are generally exposed. Although very much affected by the kind of shearing edge, and the manner in which the object is held, the resistance of most materials at common temperatures is, in round numbers, generally assumed to be equal to the tensile strain.—Thus, for example, if a pin in a joint must be sheared off in three places to allow the joint to separate, we assume the resistance of said pin to be equal to three times that which would rend it asunder, by a fair pull in the direction of its axis.

Third, The crushing strain, or that to which stone or brick are generally subjected in buildings. The same strain, much modified by the length, however, is that which is resisted by piles, pillars, struts, stanchions, and the like. The strength of most materials to resist a crushing strain is greater than its tensile strain when the object is of little length, but far less when it becomes much lengthened, as in the long and slender connecting rods of steam engines.

Fourth, May be ranked the twisting or torsional strain. It is that to which, more than any other, the shafts of mills and geared work are exposed.

The fifth, and last in our series, is the transverse or cross strain—that to which we always subject material when we intend to break it, this fact of itself being sufficiently indicative that the material opposes less resistance thereto. This is the strain on girders generally, on levers of all kinds, on the arms of wheels and pulleys in machinery, on the axles of carriages and cars, on the brest-summers or girders of bridges, and on the rafters and floor timbers of buildings, etc.

The ability to resist the tensile strain depends entirely on the area of the cross-section, whatever may be its form. A square, flat, or round bar of wrought iron one square inch in section, will bear a strain of from 50,000 to 90,000 pounds, and in that proportion for any other size, without regard to form. But it must be remembered that this calculation refers to sound iron alone, and that very large rods are liable—in fact are almost certain, to be imperfectly welded. Cast steel bears more; in some cases as high as 125,000 lbs. per square inch. Cast iron bears less, ranging from 8,000 to 40,000 lbs.

In resisting crushing strains, the form is important. A hollow pipe is far stronger to resist this strain than a solid pillar of the same weight, partly on account of the superior soundness of the metal, but partly also on account of the advantage this distribution of the metal affords in resisting the tendency to bend. Pillars or props of any considerable length almost invariably bend to one side before crushing or splitting; and in such cases the material, in fact, becomes exposed to a transverse strain—the fifth in our series. The torsional strain is best resisted by a tubular form; but, for convenience in manufacturing, shafts of all kinds, except large cast iron ones, are usually made round and solid. Nothing is gained by squaring, or adopting any other form except the hollow.

The transverse strain has been very carefully experimented on by ancient and modern philosophers, both on a small and a large scale. Gallileo first established the grand and fundamental theorem—the only point of importance which can be noticed here—that the strength of a beam, or other mass of material exposed to this strain, is as the square of the depth. A timber, for example, will resist a load in proportion to its width multiplied by the square of its depth, and divided by its length. It is, on this account, advisable to make every part exposed to this strain as deep as possible in the direction of the strain. For this purpose floor timbers, the beams of steam engines, the girders of bridges, and generally all large pieces exposed to this strain alone, are made comparatively narrow and deep. But there is a limit beyond which this form cannot be carried to advantage. Thus, for example, timbers may be made so very deep and thin as to bend to one side, or twist, when exposed to a load; and, in fact, generally large warehouses and the like, are made with the floor timbers somewhat too thin and deep to stand well alone; but by stiffening with light strips extending diagonally across from one to another, they are compelled each to support the other, and thus they resist this tendency very efficiently, and the floor as a whole is an example of the greatest strength practically obtainable with the quantity of material employed.

Strength and Temperature.

The strength of different materials differs very greatly, not only in regard to absolute cohesion, but also in ability to resist different *kinds* of strains. When quite juvenile, we were once thrown upon quite intimate terms with a very distinguished civil engineer, and were much struck with his answer to an inquiry as to what was "the most important point to be attained in preparing for the profession?" The answer was simply "a knowledge of materials." The strength of some materials is affected very greatly by temperature. Copper, for example, grows weaker with every elevation of temperature above the coldest ever yet tried, while iron grows stronger by warming up to a certain point, a change which, by the way, as is much to be regretted, has never been attended to in the long and careful experiments on this material made at the expense of our government a few years since. Common consent, based on imperfect experiments made many years ago, has assumed the maximum strength of most varieties of iron at about 500° Fah., but some recent experiments by Fairbairn—Wm. Fairbairn, Manchester, Eng.,—indicate a point much lower, or somewhere between 200° and 300° Fah. At all events, it is well established that this metal loses much of its strength—probably at least one-third—by intense cold. In almost every material a low temperature adds to its rigidity and liability to break by sudden impact, if it does not detract from its cohesive strength.

Galvanized Iron.

Last week we described Morehead's process of coating iron with zinc, and it is generally allowed to be an excellent method. Iron, however, may also be covered with zinc by other modes of treatment; but it is necessary, in every case, to clean its surface first by acids and scrubbing with sand, to remove all scale and oxyd, or the zinc will not adhere to it. A very common zincing process is to dip the cleaned iron first into a solution of sal-ammoniac, then into the bath of molten zinc, the surface of which is covered with a thin stratum of powdered sal-ammoniac. The plate or sheet of iron may be held by each end with a pair of tongs, dipped vertically and slowly into the molten zinc, held in it for a few moments, and then lifted out. If held in the molten zinc too long, the iron becomes very brittle. This is the method in most common use for zincing iron chains and small articles; these may be kept in the molten zinc bath much longer than thin sheet iron. This process is public property.

The strength of the dilute sulphuric acid for removing the oxyd and scale must be proportioned to the articles to be treated. Sheet iron requires a weak liquor; chains for pumps and other strong iron articles, may be immersed in a strong liquor, made with a gill of the acid added to five gallons of water. The articles when taken out of the acid are always scrubbed in warm water with sand or emery.

In France, a bath of hydrochloride of zinc is frequently employed as a substitute for the sal-ammoniac preparatory pickle. It is made by dissolving zinc in muriatic acid, and is used at a strength of 17°. We do not believe it is superior to sal-ammon ac; one pound of which, dissolved in five gallons of water, makes a good liquor, which must be frequently renewed while being used.

Pure zinc must be used in these operations or the process will prove very troublesome and often fail. The zinc of commerce is often adulterated with arsenic and lead.

It has been frequently proposed to zinc or galvanize iron by the electrotype method in some form; but this—the real galvanizing process—although it is the best for the iron, is too tedious and expensive to be employed for coating common or large articles. It is, therefore, not in use anywhere, so far as we know. The zincing of iron by the two hot processes we have described, is now pretty generally practiced in Europe and in our own country; in fact, it is fast becoming a great business among us. In this city, we have been told, that 2,000 tuns of iron are zinced per annum; in Philadelphia, 800 tuns, and in Boston and some other cities in the same proportions.

We might describe some other methods of galvanizing iron, but we have given those believed to be the best and most simple. The information imparted will enable any person to coat iron articles with zinc, if he has only an iron kettle for melting the metal, and a wooden tub for scouring his articles and containing the preparatory solution.

Artesian Well Water.

We have spent the most of a day among the deep-tubed wells of this city, and now wish to give our readers the benefit of the results for application in other localities. The water is not uniformly good, as we were led to suppose, when after a visit to one alone we wrote the article of March 7.

To aid those of our readers who are not conversant with the position of New York city, we may remark that it stands on an island called Manhattan, a moderately elevated strip of land twelve miles long and two miles wide. It is situated at the mouth of the Hudson, called here the North river, and separated from Long Island by a narrow strait termed the East river. In the channels of both the North and East rivers, the tides rush in and out with considerable force, and the fresh water of the Hudson is so extensively commingled with that from the sea, that except in great freshets, when the torrent from the country temporarily drives out the sea, the water on both sides of the island may be considered ordinary salt water. Wells sunk to a little depth yield plenty of hard, unpalatable water, which is little used since the completion of a magnificent aqueduct forty miles long, which, by a gradual descent, brings in the water of the Croton river, and distributes it to all portions of the city.

The International Hotel (Taylor's) stands nearly midway between the North and East rivers, and the tight tube (some twenty inches in diameter, driven down some seventy-five feet below the surface springs.) brings up water which, judging from a fairer sample than before, would, in the absence of the Croton, be tolerable water for the table, but it is a little salt and limy, and is consequently not used at all for any purpose. The well is a complete failure for hotel purposes, as it is deemed inexpedient to attempt to lay and keep in order two sets of pipes for conveying water over such a structure. We should have distinctly stated in our former notice that the well water is not used.

Tatham & Brother, in Beekman street, near the East river, sunk a tube 120 feet, found an inadequate supply of brackish water, and abandoned the tube, allowing it to fill up, and dug another well three feet in diameter around the first to a depth of only 45 feet, which gives them plenty of common well water. They use it only for condensing steam.

Ockerhausen & Co., sugar refiners, sunk a tube 100 feet, with a large well around it 45 feet deep, and draw the water from both mixed together. This mixture is no criterion, of course, but we may remark that it is decidedly bad.

Kattenhorn, Brunjes & Co., sugar refiners, near North river, sunk a twenty inch tube 99 feet, and obtained fresh muddy water first day, but did not taste it very carefully, and could get nothing but almost pure salt water from it since. Have filled it up, and dug a large well around it 25 feet deep, which yields ordinary well water in liberal quantities.

Havemeyer & Moller, sugar refiners in Vandam street, who have been announced as pumping 350 gallons per minute from an artesian well, never had such, but pump all their water for condensing from a large surface well.

John Harrison, brewer, Sullivan street, has a very successful example, about 120 feet deep. Yields from 75 to 150 gallons per minute of good water, which is used for beer and for all purposes. Used in the boilers, it produces no sensible incrustation, and deposits less mud than even the pure Croton.

Whether, as we have heretofore supposed, the surface water becomes in this case greatly purified by filtering down through an increased depth of earth, or whether this tube chances to penetrate a channel connecting with a distant and superior spring we are unwilling to decide; but the fact that the sugar refinery of R. L. & A. Stuart, (another place we visited,) is supplied with an extremely liberal quantity of equally good water from two large surface wells, argues in favor of the latter supposition. Mr. A. Stuart, who very courteously showed us about the premises, feels assured that the good water of both is due to a chance communication with springs in the upper portion of the island.

The well on Duane street, (late Howell & Co.'s sugar refinery,) has exemplified two evils which it may be important to avoid in other localities. The well was successful until by pumping too fast—before the water had washed out suitable minute channels for its conduction—the influx started up the earth and excavated a cavity. On driving the tube down farther to avoid this, it is supposed to have been planted so tightly on the ledge of rock which underlies the whole city, and which chanced to be flat and dense at that point, that the supply has since been too feeble to be of importance.

In nearly all the cases referred to, the wells are dug in the cellar of the building, and the surface of the water when at rest rises nearly to the level of the cellar floor—in one case within about fifteen inches. In another instance, where the engineer, backed up by a plumber of experience, insisted that the water surface was forty feet below the pump, and that in opposition to all theory the water was successfully raised that hight by the vacuum; we sounded with a tape, and found the actual depth of the surface to be nine feet.

It appears from all these examples that the chances of obtaining good water from such wells in quicksands below the level of neighboring salt water, although sufficient to induce the attempt in cases where success would be a very great desideratum, are not by any means as certain as we had before intimated. We give these facts as they stand. This is the best answer we can make to numerous inquiries and suggestions in relation to the subject. We have neither the data nor the leisure to make up an elaborate article on the subject. We believe that *generally* the earth, however near the sea, may be assumed to be saturated with fresh water to an indefinite depth, and that the accessions of rain on the surface, by filtering down and displacing it, creates a slight current, flowing through the interstices from the land into the sea. When a deep well penetrates below the sea level, it attracts to itself this insterticial current, and if the sand is tolerably uniform, like that of a great part of Long Island, the drainage thus effected may be estimated with some certainty as extending to a certain measurable distance, and with given effect in all directions. But, on the contrary, if the earth is partially composed of firm layers, which can retain and guide the water, it may be conducted from an immense distance entirely independent of any filtration from the surface. This is the case at Grenelle, near Paris, where the water spontaneously rising through a tube sunk to a depth of eighteen hundred feet below the surface, is by every indication identical with that of lakes situated two hundred miles distant. On this island the source of the water obtainable from wells

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sunk in the loose earth is, as shown by the above, somewhat uncertain. It may be observed that most or all of the tube wells examined yield water of a quality between that of pure, soft water, like Croton, and that of the hard nauseous fluid from the surface wells.

California Wants and our Manufactures.

We have received quite an interesting letter from one of our correspondents—Mr. A. Doolittle, of Alpha, Cal.—in which he complains of the depreciation in the character of many of our manufactures recently sent to the Golden State. We will specify some of these:

India Rubber Goods.—The india rubber boots recently exported to California are much inferior to those formerly sent there. As the consumption of these have increased, inferior kinds have been manufactured and sent out to meet the demand for them. The retail price for one pair is from $7 to $9, and the same sum for an india rubber coat. After a few days' wear by the miner, the boots come apart in the seams, and the coat leaks somewhere, and thus they are rendered totally useless. India rubber clothing is indispensible to miners, and they are willing to pay a good price for them, but they must be impervious to water. When a miner gets himself wet (and he is constantly exposed to water) by the leakage of his coat or boots, he is liable to become sick. Some good qualities of india rubber miners' clothing are still to be found, but the complaint is, that a great quantity—indeed, the mass—has become bad; and this we desire to tell the manufacturers of such goods, whoever they may be, is a gross imposition, and the wrong will recoil upon their own interests if they do not reform their conduct.

Miners' Picks.—The "Collins" picks have depreciated in character. They are too small in the upper side of the eye, and are liable to become loose. Their stock is good, but they contain too little steel; their axe ends are rather wide and light, and their pointed ends too short and light. The axe end generally bends down; the pointed end wears up with a very few days working. As formerly made, the picks could be repaired by a blacksmith, but now they are so small they cannot be worked over. The sledge hammers sent to California have too little steel on their ends, and soon wear out. As great quantities of picks and other miners' tools are required in California, and vast sums of money are paid for them, the manufacturers of such implements in the East stand a very fair chance of losing this trade altogether. Our correspondent says, he will not buy another box of the kind of picks referred to. Such articles will be manufactured hereafter in California unless better goods are sent there.

Quartz Mining Machinery.—The machinery that had been exported for this kind of mining was ill adapted for the purpose, and all such machinery is now manufactured at great expense in California. The old stamping mill maintains its ground against all other grinding mills. Quartz rock mining is generally looked upon with suspicion as a losing business, as quite number of companies have failed in consequence of such operations. Last year, however, was a more favorable one for quartz mining, and the prospect is still growing brighter. No doubt much money has been lost for the want of proper knowledge on the part of those engaged in quartz mills, but experience will teach them, and success, we believe, will yet crown their efforts. If the California quartz is as rich in gold as is asserted, surely quartz mining will ultimately pay well, if properly managed. It does so in other parts of the world. Why not in California?

Our correspondent has given us information respecting the late depreciation in the character of certain articles sent to California, and those which are much required in that State. We have directed the attention of the manufacturers of such goods or wares to the subject, with the express object in view of giving them correct information, in order that they may hereafter—for their own benefit, as well as that of the people of California—change their miserable policy, and make and send better goods to their Californian customers.

Americans Raising Sunken Vessels.

Our countrymen have long been distinguished for raising sunken vessels, and for submarine feats in general. A Boston carpenter, prior to the Revolution, made an independent fortune, and at last received the order of knighthood in England, for raising great treasures from some sunken Spanish galleons. A few years since, American submarine divers, after repeated failures by Englishmen, removed the hull of the steam frigate *Missouri*, which was sunk at the mouth of the harbor of Gibraltar. Their character stands very high for marine engineering, and an evidence of this fact is found in their employment by the Russian government, to raise the ships which were sunk at Sevastopol during the famous siege of that city. We understand that the contract was made with Col. J. E. Gowan, of Boston, who achieved so much distinction at Gibraltar, and he has departed with a large corps of Americans to carry out his engagements with Russia. Apparatus has been sent from Philadelphia and Boston to Sevastopol to conduct the operations, and our countrymen are confident that they will succeed in raising the sunken fleet, which amounts to one hundred vessels—large and small—some of these being 84 gun ships. The undertaking is one of great magnitude—the greatest of the kind ever attempted—and will be the means, it is believed, of making the fortunes of the principal persons engaged in the enterprise—Col. Gowan, and those whom he has associated with him.

In raising a sunken vessel, submarine armor and the diving bell are employed to make explorations under water, in order to enclose the vessel so as to shut out the surrounding water. The water is then pumped out of the sunken vessel, and *camels* are afterwards employed to raise it up—float it. Compact steam engines and centrifugal hydraulic pumps have been sent to Sevastopol, and also some india rubber camels. Marine *camels* were first employed by the Dutch in Holland about 1690. They consist of two similar hollow water-tight wooden vessels, so constructed that they can be applied on each side of the hull of a ship. On the deck of each, windlasses are attached which work the chains passed under the keel of the vessel to be raised. When the camel is employed, the water is allowed to fill each half of it; and when the ship is firmly attached to it, the water is pumped out, and the buoyancy of the hollow vessels raises it up. A ship drawing fifteen feet water could by this means be made to draw only eleven feet, and the largest man-of-war then in the Dutch service made to pass the sand-banks of the Zuyder Zee.

It has been related that during the war in 1812, some vessels were built in Buffalo harbor for action on the upper lakes, and being of too great draft to cross the bar, they were actually lifted over it with camels, and did good service afterwards under Commodore Perry.

Telegraph to the Pacific.

In the number of the Scientific American for June 14th, 1856, (page 317), we directed attention to the necessity of having our telegraph lines better constructed and more perfectly insulated than they now are. The article arrested the attention of S. P. Gilbert, of Horicon, Wis., who has, through the *Argus* of that place, referred to it, and has suggested the following method of constructing a telegraph line, which has been proposed to be run between this city and San Francisco. He says:—

"The difficulty of keeping a Pacific telegraph line of several thousand miles in length across the western prairies, the uninhabited regions of New Mexico and the Rocky Mountains to California, in working order, suggested to my mind the following plan. The principal points are these:

First—The telegraph cable to be laid in Kyanized wood tubing, at a depth of say two feet under ground.

Second—The cable to be coated with gutta percha the entire length, like the Atlantic line.

Third—The channel of the cable to be dug by a locomotive steam ditcher (of some sort) two feet deep, and four or five inches wide.

By this plan the line will be perfectly *insulated* the entire length, and *free from atmospheric electricity*, from falling trees, from Indian depredations, from prairie fires, and heavy gales. Instead of being strung up, Haman like, fifty cubits high, it will be below the reach of accidents, and at rest in the tube; not subject to tension by its own specific gravity, or the pressure of winds."

This plan of a Pacific Telegraph is worthy of consideration. The kyanized wooden tubes may also be saturated with wax varnish, and thus rendered fully as good non-conductors as the gutta percha coating of the wires. The great objection to this method of constructing a new telegraph line, is its vast expense, in comparison with elevated wires; but when constructed, the cost for keeping it in repair would be much less.

Caribbean and Peruvian Guano.

In the Chemical Department of Brown University, Providence, R. I., some Caribbean Sea guano has been analyzed by Professor A. P. Hill, and found to contain the following ingredients:—Phosphoric acid, 13·50 per cent.; organic substances, ·21; lime, 19·10; alkalies, 2; water, ·40. Only 2 per cent. of ammonia producing matter was present. Some carbonic and nitric acid, with a little aluminum, were present. The phosphoric acid was in the form of insoluble phosphate of lime. This is a very inferior guano, and our farmers should be made aware of it. The two most valuable constituents of guano are ammonia and phosphoric acid. The genuine Peruvian contains 17 per cent. of ammonia, and 15 per cent. of phosphoric acid, but the former is seven times dearer than the latter. The "Caribbean Sea guano," at twelve dollars per tun, is dearer than Peruvian guano at sixty dollars per tun. This information we have found in the transactions of the Rhode Island Society for the Encouragement of Domestic Industry.

How to Launch the Great Eastern.

The preparations for launching this monster ship are rapidly progressing, and it is expected that she will be ready for launching early in July. The plan intended to be adopted is thus described by Mr. Brunel. In constructing the foundation of the floor on which the ship is being built, provision is made at two points, to insure sufficient strength to bear the whole weight of the ship when completed. At those two points, when the launching has to be effected, two cradles will be introduced, and the entire fabric will be lowered down gradually to low water mark, whence on the ensuing tide, the vessel will be floated off.

The dock is to be excavated, and the leviathan ship is to be dropped gently down into the water. How this monster vessel was to be launched in such a narrow river as the Thames, has been the frequent theme of conversation among nautical architects and engineers. Brunel himself has solved the problem satisfactorily.

Photographic Improvement.

Wm. Mayall, of London, some time since obtained a patent for a composition of barytes and albumen, which the English photographic journals speak of in glowing terms. By the substitution of paper for the metallic plate the advantage that was gained in perspicuity was lost in delicacy. Paper, from its fibrous nature, absorbs the middle tints; and hence in the case of colored works, the artist was forced, by stippling, to supply the defects of the photographer. The chemical properties of ivory render that substance inapplicable to the purposes of the art. But Mayall's compound has the appearance and close texture of ivory, without any of the resisting qualities. The artist executes a work equal in finish to the old ivory miniature, endowed with all the truthfulness proper to photography.

The last number of *Harper's Weekly* illustrates the laying down of the Atlantic Telegraph cable. This is taking time by the forelock, like the account given of an execution before the victim is thrown off the scaffold.

Headache Snuff.

The London *Medical Circular* gives the following formula for a cephalic snuff, which is perhaps equal, if not superior, to any of the snuffs sold for catarrh, sick headache, &c.:—Take Lundyfoot and black rappee, of each half an ounce; powdered asarabacca, one to two drachms; water, ten or twelve drops; mix well, press the mixture tightly into a small bottle or tin canister, and allow it to repose for a few days. For use, throw a spoonful or two on a piece of writing paper, crush the lumps with the tip of the finger or a knife, and then place it in the snuff box. A Tonquin bean kept in the box with it is a great improvement. One to three pinches to be taken daily in headache, &c. It is also excellent as an "eye snuff." Asarabacca is a plant found native from Canada to the extremeties of North Carolina, yet it is difficult to obtain from druggists. Its leaves dried and reduced to powder have long been used for cephalic snuff. A few grains taken at night produce a watery discharge, which, in many cases, remove headache, opthalmia, and some paralytic complaints.

Fine Cotton.

A bale of Sea Island, from Charleston S. C., recently sold in this city for $1·25 per pound. It was purchased to go to Brussells, for the manufacture of lace. It is stated to be the fiuest cotton ever raised, and capable of making yarn as fine as No. 900. An idea of the quality of this cotton may be obtained from examining common cotton cloth at about twelve cents per yard, which is generally made from No. 36 yarn.

Sugar.

This sweet necessary of life still keeps up in price, but some are of opinion it must come down, because it is asserted that there is a large supply in the market.

The maple sugar product this spring has been large, the season was propitious and it is calculated by statistics received from various districts that the amount will not fall much short of seventy million pounds.

The Comet.

Von Littnow, the great German astronomer, writes to the Vienna *Gazette* that there is still a faint possibility that the great comet of 1556, referred to on our last page, may return, but that its "orbit is so situated that it cannot approach the earth within some five millions of miles." He rates M. Babbinet severely for exciting an alarm of the subject.

New Atlantic Telegraph Company.

It is proposed in England to form a new company for a telegraph across the Atlantic, with one relay station at the Azores. The cable is to be laid from the Land's End to Flores in the Azores, where there is to be a station with the relay batteries. From thence another cable is to be laid, either to Halifax or this city.

Screw versus Paddle.

The Peninsular and Oriental Company's paddle-wheel steamer Ripon is to be turned into a full powered screw steamer. She has been many years employed in the Alexandrian mail service, and was employed in the transport service during the Russian war.

The Rise in the Price of Diamonds.

This prince of gems, though merely a condensed form of carbon, is everywhere the accompaniment and the representative of wealth Of late there has been an immensely increased demand for them, and an extraordinary rise in value, amounting within the past year, it is stated, to twenty-five per cent.

Detection of Cotton in Woolen Fabrics.

Dr. Overbeck states that when the fabric is three times immersed in a solution of alloxantin in ten parts water, pressed and dried, then exposed to dry ammonia and washed with water, the wool fibres are dyed carmine color, while the cotton fibres remain colorless.

In the city of Philadelphia paper hangings are manufactured annually to the extent of 1,500 tuns in weight, which amount to 3,240,000 rolls of 30,000,000 yards.

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Machine for making Paper Segars.—We have a correspondent from South America who wishes to purchase a machine for the above purpose. We shall be glad to receive information in regard to where one can be seen in operation.

A. W. King, of South Hanover, Ind., wishes to ascertain where he can procure the best machinery for manufacturing corn starch.

J. A. L., of Tenn.—You propose to amend the patent law by compelling inventors to engage in manufacturing their inventions for two years before granting a patent. If such a law were in force, it would kill the most meritorious. Such a law would have prevented James Watt from obtaining a patent for the steam engine. He had no means, like hundreds of other excellent inventors, to engage in manufacturing for himself.

L. M. F.—You appear not to be aware that a tunnel under the East River was proposed some years since. Your plan may be as good as that of others. If you believe it to be better, bring it before the public.

W. C. R., of C. W.—Your water power of 18 ft. head and 400 inches of opening at its foot, is about 114 horse power, allowing one foot of head equal to one foot of perpendicular fall.

W. W. H., of Ind.—We will give you a rule to calculate the horse power of your engine, and you can then work out the minutiæ yourself. Multiply the speed of the piston in feet per minute into the mean pressure per square inch of piston, and divide by 33,000—the result is the amount of horse power; no allowance is thus made for friction.

G. A., of Ga.—An elevated fountain will raise water in a tube to its own level, no higher. With a hydraulic ram, a fountain ten feet high will raise a jet of water fifty feet high, but will only discharge at that hight one-fifth of the water used. Address Joseph Strode, West Chester, Pa., for other information you desire.

J. H., of Md.—A cheap wash for rough boards may be made with lime and the scales and ashes from a blacksmith's shop. It is put on like common whitewash, and it has the color of light buff. You need not be particular as to the proportions of lime and iron oxyd. Do not expect it to be so durable as paint.

G. P., of C. W.—On page 25 of Vol. 5, Sci. Am., you will find an engraving of a submarine lamp.

S. B. B., of Texas.—Rosin oil is too smoky to be used in common lamps. There is no useful work to our knowledge published on tinsmithing.

J. A. S., of Phila.—Common putty is a good plastic material for makiug patterns of castings. Gutta percha is excellent for making patterns for cold moulding, such as plaster of Paris, but is not suitable for hot moulding. The putty mould must be allowed to dry before it is used, and the surface should be dusted over with the flour of shell lime.

G. H, of New York.—The communication on another column relating to Berlin castings may lead you to adopt such a course as the one respecting which you request information from us.

M. B., of N. Y.—Your burning fluid may be very excellent. It does not interfere with any patent so far as we know.

J. W. & Co., of Mass.—The articles on galvanization in the last and present number will give you all the information requi ed.

F. E. B., of Conn.—The water pipes must be wholly made of hydraulic cement, or they will not answer. We would not advise you to employ such for carrying the water over a hill of twenty feet high from a fall of 100 feet. Use either lead or iron pipes for this purpose. The 100 feet fall will cause a very rapid current—a velocity of eighty feet per second at the foot of the pipe.

J. W. K., of N. H.—The velocity of water down an incline is just in proportion to the vertical fall. If the incline be fifty feet long, and the perpendicular fall only nine feet, the velocity will be 24 feet. This leaves the friction of the incline out of the question.

E. M. E., of Pa.—Wax dissolved in alcohol is a cement much used by instrument makers, also putty colored red with vermilion.

C. A. M., of Mich.—The Engineer and Machinists' Drawing Book, sold by Blackie & Son, this city, will answer your purpose, as it contains several drawings of steam engines.

J. M. B., of Pa.—A patent could not be obtained for an instrument for drawing nails constructed after the model of dent ists' forceps for extracting roots of teeth. In such a case as this you have clearly invented nothing not already known to the mechanical arts. If there is any substantial change in the construction of the instrument it might be made the subject of a patent.

P. M., of N. Y.—Four parts of iron filings, a like quantity of potters' clay, and the same of old crucibles reduced to powder, and made into a paste with salt water, makes a strong and durable fire-proof cement. It must be allowed to dry slowly before being exposed to fire.—Fire-clay will answer as a substitute for the old crucibles.

G. B., of Conn.—Smees' Electro-Metallurgy, published by J. Wiley & Co., this city, will give you the information on electro plating. It would require several pages of manuscript to describe the process of treating jewelers' sweepings to recover the gold and silver. Steel springs are all tempered in oil.

E. B. C., of Mass.—We have seen small cut pinions case-hardened, but not large wheels. We have never heard a complaint made against cut gearing on account of being too soft.

J. W. H., of Mass.—"Please inform me whether an individual has a right to manufacture and use a patented article, provided he does not offer it for sale; and also whether a party buying an article of an assignee can carry it into territory not owned by the assignees, and use it for his own benefit?" The above inquiries are very often made of us, and are frequently answered through this column. A patent is an exclusive monopoly, and, to say nothing about the use, no person has a right to even *manufacture* an article upon which a patent exists without the owner's consent. What would be the value of any patent if it could be thus made and used without the consent of the patentee? None whatever.

G. C. W., of Mass.—There is no good recent work on the steam engine. John Bourne's Treatise, price $6, or the same author's Catechism, price 75 cts., are good.

Money received at the Scientific American Office on account of Patent Office business for the week ending Saturday, May 2, 1857:—

G. W. B., of N. Y., $30; W. W. B., of N. Y., $27; S. A. B., of L. I., $30; S. D. H., of N. H., $30; C. F. H., of Pa., $30; W. & E., of Md., $25; J. H., of Ala., $55; C. & S., of N. Y., $225; J. H. P., of N. J., $30; J. McI., of Ill., $30; S. O. C., of R. I., $30; J. L. F., of Ill., $30; A. B. G., of Conn., $30; J. W. L., of N. Y., $30; W. W. D., of Cal., $170; G. S. M., of Ill., $25; C. and C., of Mass., $30; W. S., of N. H., $12; C. B., of M, T, $13; A. C., of N. Y., $35; S. L. W., of Pa., $30; C. A., of N. Y., $60; A. B. J. F., of Ind., $30; J. G., of O., $30; J. W. P., of Ill., $35; J. V., of Pa., $30; J. F. R., of Iowa., $30; J. M. E., of Conn., $55; G. W., of N. Y., $25; T. C., of N. Y., $25; S. H. W., of O., $25; P. & N., of N. J., *25; T. M., of N. Y., $30.

Specifications and drawings belonging to parties with the following initials have been forwarded to the Patent Office during the week ending Saturday, May 2, 1857:

G. W., of N. Y.; D. S. McN., of N. Y.; W. W. B., of N. Y.; E. F., of Iowa; S. O. C., of R. I.; A. R., of Tex.; T. C., of N. Y.; W. & E., of Md.; J. E., of N. Y.; A. B. J. F., of Ind.; B. A. A., of Ind.; C. W., of R. I.; C. B., of M. T.; A. C., of N. Y.; S. H. W., of O.; P & N., of N. J.; T. M., of N. Y.; A. & M., of Ill.; T. V., of Cal. A. B. G., of Conn.

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Science and Art.

The Appearance and Movements of Comets.

The solar system consists of its central sun, supplied by its own mysteriously caused and unsurpassably intense light, a number of substantial planets, which, with their satellites or moons, reflect light received from the sun, and of an unknown number of singular appearances termed comets. The last named class attract attention only at intervals. The planets, sailing at regular distances round the sun, are, on the contrary, always more or less subjects of examination.

The term *comet* signifies *long hair*. The heavenly bodies which we denote by this name, have frequently one or more tails, or radiating arms, though some have none. It is worthy of especial remark that the diminishing horn or luminous streak attending comets, does not lie in the path behind the main body, like the smoke and flame following a burning brand thrown through the air, but like a luminous shadow is invariably projected in the direction opposite to the sun. Comets shine by a light, the nature of which has, so far, been undetermined; some astronomers deciding it to be solely reflected, and others purely direct, like that from a fire, or from phosphorous. Comets are very erratic in their movements. If the regularity of the motions of the sun and planets be properly compared to the wheels of clock-work, comets may be described as insects which buzz in and out amongst them. So far there has been no collision observed between a comet and any planet, nor in examining the motions of the latter can there be detected indications of any motion which could, by any supposition, have been derived from such a collision.

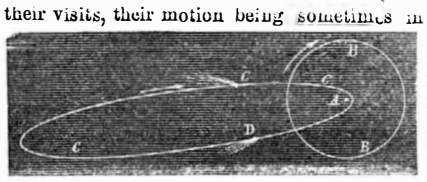
The earliest records of comets are very extraordinary, but they are preserved in such terms as are very unsatisfactory. They were universally regarded with superstitious awe, as forerunners of war, pestilence, or the like, and are described as "flaming swords" of "prodigious size," "presenting an horrible aspect," and the like terms, of no possible value as data for comparison with other heavenly bodies. But there is reason to suppose that there were exhibitions far more brilliant and extraordinary than any observed in later times. One is described as rivaling the sun in brilliancy, and although it is difficult to say how much in this expression should be allowed for extravagance in the writer, it cannot be an ordinary display of what are now, at best, but blazing stars. Hundreds of appearances and disappearances of comets have been carefully observed since astronomy has been cultivated as a science; and although no two appearances exactly agree, there have been sufficiently near coincidences, both in magnitude and times, to identify several. Sir Isaac Newton, Edmund Halley, and others worked out and collated a great amount of evidence regarding a remarkable one appearing in their time, in 1682, and judged it identical with that of 1531 and 1607. They predicted its re-appearance about the year 1759, and again about 1835, and the comet kept both these appointments with tolerable punctuality. Its period being 75 or 76 years, this body termed "Halley's Comet," will make its next appearance about 1910.

Several less important comets have been quite carefully timed. M. Biela, of Josephstadt, discovered Biela's comet, a small affair, completing a revolution in 6 3-4 years. This is a faint body without a tail, and only seen through telescopes, as are also Professor Encke's of Berlin, having a period of 3 1-3 years, De Vico's, of Rome, of a period of 5 1-2 years, Brorson's, of a like period, and Peter's of 16 years.

Comets revolve in anything but circular orbits. The larger ones dash in from the darkness of space, pass very near the sun, shining at those periods with great brilliancy, and again retire in the same manner, gradually fading as they withdraw. This accounts for their appearing only at intervals. The orbits of some, so far as can be observed, indicate that they will never return; but the great mass are *supposed* to be more or less regular in their periods; the telescopic comets of short periods, referred to, do not retire to any very great distance, but are, at all points of their course, within the orbit of Jupiter.

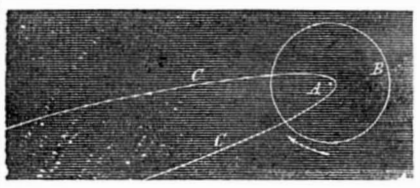
Some comets move very swiftly, others with extreme slowness. Some pursue a very irregular course; but Newton's law of gravitation fully accounts for all these motions. Observation, so far as such has been made available, indicates that all move in paths which, but for the influence of the planets, would be either ellipses, parabolas, and hyperbolas.—These terms are worthy of a further elucidation.

In fig. 1, A represents the sun, B the orbit of the earth, and C the path of a comet moving in an ellipse. In this general form, but more or less elongated, are the paths of all those comets which have been found to repeat their visits, their motion being sometimes in



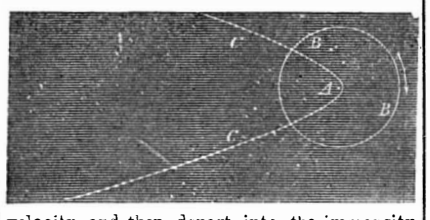
the direction represented by the arrow, or corresponding with that of the earth and other planets, and sometimes in the reverse direction. Whatever the direction of the motion, the tail is always stretched from the sun, so that it streams behind as the comet approaches, and goes before it as it recedes from the sun, the latter condition being represented at D. The propriety of terming such an appendage a *tail*, may be very much questioned.

Fig. 2 represents the path of a comet, which, like that of a very notable one in 1680, if an ellipse, is so extremely long that it could not



be distinguished from a parabola, or one of infinite length. It is, therefore, very uncertain when, if ever, this comet will return.

Fig. 3 represents a comet moving in a hyperbolic orbit, or one which cannot connect and return into itself. Such comets cannot, in the nature of things, ever return again.—They travel almost directly toward the sun, with a continually increasing speed, make a kind of short bend around it at an immense



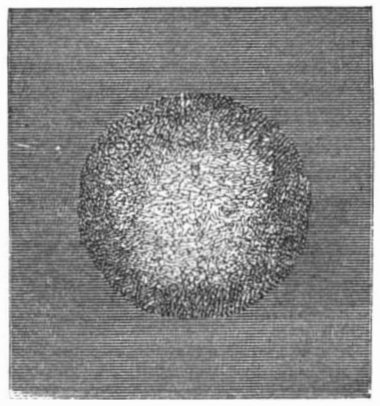
velocity, and then depart into the immensity of space, to be attracted, it is presumed, finally into some other system, where the same interesting programme will be repeated.

The first appearance of any comet is usually faint. As they approach the sun they become more luminous, and throw out tails of greater or less length, and as they retire fade away in the same manner. But it is a remarkable fact that each successive appearance, either of Halley's, as of any other known comet, has has been less brilliant than before. It has been conjectured by some that the matter forming the tail, whatever may be its nature, is diffused in space, and never attracted back to join the mass—a theory sufficient to account for the diminution of each.

Planets all revolve in pretty nearly the same *plane*. By this we mean that their orbits can all be traced with tolerable correctness by making circles or slightly elliptical figures on a sheet of paper, or on a field of ice, but the orbits of comets seem to observe no such law. Their paths could only be represented by supposing an immense number of rings, or rather long elliptical loops, shook up together irregularly.

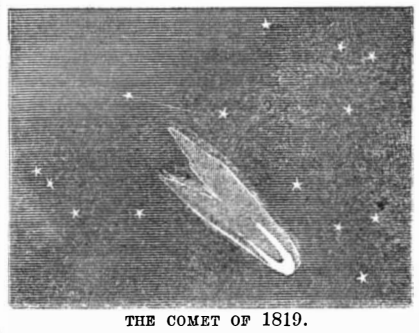
The possible collision of a comet with the earth is now attracting considerable attention from a silly rumor that a French or German savan has predicted such an event to occur on the 17th June next. The distinguished astronomer referred to has utterly disclaimed any such prediction, asserting in a published letter that the only comets in sight, or expected, move in paths which do not coincide with that of the earth at any point, and that the chances are exactly on a par with those of a collision of an omnibus in the streets of London with another in the streets of Paris.

Millions of miles are quantities which it is difficult to grasp and compare, but most of our readers are habituated to the contemplation of models and drawings on a small scale. Common drawings and orreries do not pretend



TELESCOPIC VIEW OF BRUHN'S, ONE OF TWO NEW COMETS NOW VISIBLE.

to show magnitudes and distances, but only the motions. A correct model on the liberal scale of one million miles to one foot, would represent the sun by a cannon ball ten inches in diameter, and the earth by a shot one-tenth of an inch in diameter, and revolving in a circle 190 feet in diameter about the former. Taking into account the probable number of comets which have visited, or ever will make make their appearance within the solar system, the chances of a collision have been computed by mathematicians, and endorsed by astronomers generally, to be about 1 to 200,000,000. Halley's comet, the only *large* one which has been correctly calculated for, moves pretty nearly in the plane of the ecliptic or of the earth's orbit, but the still larger one of 1680 moved like that referred to in the strong comparison to omnibusses in different cities, in an orbit which can by no possibility touch the earth. There is no up and down in astronomy; but if the orbit of the earth around the sun be represented as a level circle, the path of the comet of 1680 would be represented by



THE COMET OF 1819.

an almost vertical plunge from above, making a short bend around the sun, almost in contact, and again arising and disappearing by a corresponding path. Conditions nearly similar exist with regard to the other, the small, comets known except Biela's. This latter chances to travel in a path, which at one visit in 1832, careful computation showed would exactly cross the track of the earth, and although the times of the two masses arriving at that point differed by nearly or quite a month, it was much feared that from the unstable and fickle character of the gauzy monster, it might chance to hasten its visit, so as to endanger us.

Comets can never be timed with certainty, as they are liable to great accelerations and delays from the attractions of the planets. It is considered a very close calculation if Halley's comet is computed to within even two or three months of its actual appearance, and a prediction that a comet will be at any point on a set day will be readily seen to be most arrant quackery in science. There was in 1832 a possibility of collision, though the results would very probably have been insignificent, but at the present time no comet is expected whose orbit passes across ours.

All search for the great comet of 1556, which it was supposed might be identical with that of 1264, and consequently should have appeared again about 1848, has been long since abandoned. Two new telescopic comets have been lately visible, and the first, that discovered by M. D'Arrest, was distinctly seen for several nights through the large telescope of Mr. Campbell, in this city, but it gradually departed several weeks or months ago; and the last, discovered by M. Bruhn, of Berlin, on the 18th of March, the one pictured above, attracts no more attention than usual among astronomers.

We may recur to the subject again, particularly in reference to the magnitude of some, and the almost inconceivable lightness of all comets so far as observed.

Glycerine and Kreosote in Scarlatina.

The Boston *Medical Journal* states that Dr. King has used the above combination with much satisfaction in several cases. To one ounce of glycerine he adds two drops of kreosote, and rubs the mixture over the entire surface, except the face and scalp, night and morning, previously sponging the body well with warm water.

Cultivating Shad.

R. L. Pell, Esq., in a communication to the *Journal of Commerce*, recommends the fishermen to devote half an hour at the end of each fishing season, to plant the spawn of a dozen shad, each of which would produce fifty thousand fish towards the next year's supply. He has succeeded in cultivating the ova until they were fully developed fish.

Frankland, the German chemist, has discovered two remarkable acids, which result from the the action of nitric oxyd upon zinc-ethyl, and zinc-methyl. They slowly absorb nitric oxyd, and form a crystalline body which inflames in the air.

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